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5 hardworking jigs for the router table, p. 32





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contents

SEPTEMBER/OCTOBER 2008 ■ ISSUE 200



features

32 ROUTER-TABLE JIGS

Cover photo: Mark Schofield



68 RULE JOINT DONE RIGHT



44 CLASSIC SIDE TABLE



52 FINISHING CHERRY

up front

in the back

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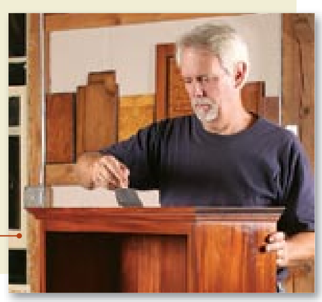
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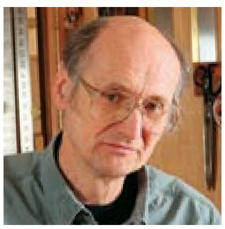


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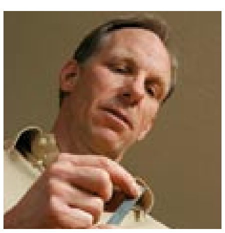
A charter subscriber to *FWW*, **Jim Richey** began illustrating and editing Methods of Work in 1979, with issue #16, and has been at it ever since (that's his self-portrait at right). Richey produces the column from his home, which was Houston in the early days and now is a small town in western Oklahoma. His interest in woodworking stretches all the way back to high school, where he built a conga drum. His latest effort was reproducing two 1929 medicine cabinets for a bathroom remodel. He is also an avid photographer.



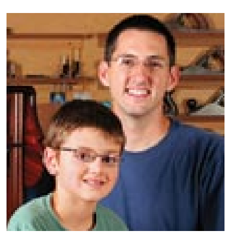
Woodworking has been a part of contributing editor **Christian Becksvoort's** life *("Cut a Mortise in Minutes")* since his father got him started as a youngster. He's been making custom furniture full time in his Maine workshop for more than 30 years. He also writes books and teaches woodworking, as time permits. Over the summer, he led a series of three workshops at the Shaker community at Sabbathday Lake, Maine.



In the years since **Steve Casey** *("A Low Console for Home Theater")* created the giant zipper that appeared on the back cover of *Fine Woodworking's Design Book Two*, he has turned his focus toward home theater furniture, cabinetry, and case goods. When not at his studio, he can be found in the winding canyons along the Pacific coast, at the throttle of a very fast motorcycle. And you can always find him online at www.stevecaseydesign.com.



Chris Gochnour *("Bench Chisels")* discovered the pleasure of building things by hand as a teen, when he made his own skateboards and snowboards. His enthusiasm for carving turns in the Utah powder was eventually replaced by a passion for making fine furniture. As a hand-tool expert, Gochnour teaches at the Marc Adams School of Woodworking and writes frequently for *FWW*.



Mike Zuba *("The Rule Joint Done Right")* started woodworking under the instruction of Lonnie Bird at the University of Rio Grande in southern Ohio, then apprenticed at the shop of L.W. Crossan. Today, he is a furniture maker at Kinloch Woodworking Ltd. in Unionville, Pa. Knowing how important it is to learn the craft from a master, he's wasted no time passing on his woodworking expertise to his 8-year-old son, Mike Jr.

For more information on our contributors, go to FineWoodworking.com/authors.

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letters

From the Editors


Gary Rogowski

STEP AWAY FROM THE PROJECT

We woodworkers, if you haven't noticed, are an obsessive bunch, tuned in to a frequency few other people can hear, looking for things few other people care to notice. We get so involved, so wrapped up in a project that it's not only difficult to stand back, it's dang near impossible to see the forest.

We are too close, of course. After several weeks or months of work on a piece, it becomes a part of our landscape. Our eyes can see nothing else. So it is very difficult to look past our failures or perceived failures and see how lovely a thing we have wrought. Instead, we focus our attentions on what we missed. What we could have done so much better.

Three decades ago, a local craft school here in Portland held a get-together for woodworkers. We emerged from the gloom of our shops to blink and peer at each other. Our bearded countenances looked back, and we managed to speak and say: "You, too?"

One of the exhibitors was a guy from Montana named Steve Voorheis. When I finished raving about his fabulous piece in the show, a wonderfully sculpted mahogany armoire, he asked me, in a conspiratorial tone, to come down to the gallery. He took me up to the 6-ft.-tall piece and said, "Look at those dovetails. I cut them all on the wrong side of the line. There are patches for each joint."

I was astonished. Here he was admitting his mistakes, *and* showing me his skillful fixes. And here I was, with my supposedly critical woodworker's eye, and I never saw them. I was so busy drinking in the rest of the piece that I didn't see, and now didn't care, that he had screwed up. I was more impressed by his ability to recover and to fix and to move on.



Few people have the skill you woodworkers have, to build things with your hands and with machines. Few people have the patience, the knowledge, the determination, and the obsession to build the furniture that you do, and for that matter, make the mistakes that you do. So when you goof, just step away from the project, Sir or Madam. Step away and no one will get hurt. It's never so bad that it cannot be fixed. And few will notice what you see as a mistake.

—Gary Rogowski runs the Northwest Woodworking Studio in Portland, Ore., and is a contributing editor.

Don't wad up your finishing rags

I just finished four picture frames using Roland Johnson's recipe from *FWW* #198 ("Hot-Rod Your Varnish"), and it's a beautiful and very easy finish as described—especially for hobbyists like me.

After completing the job this morning, I threw the used paper towels in a plastic garbage can, planning to take it to the dump this afternoon. Well, the fire department just drove away.

Within six hours, spontaneous combustion ignited the wadded towels inside the can. If we had been out at the time, we'd have lost the entire house. As it was, the can melted completely before I could douse the flames. Hopefully, my carelessness will help one or more of your readers avoid a catastrophe. As the article said, always spread out wet finishing rags and let them dry completely before throwing them away.

—BASIL PAPAHARIS, New Canaan, Conn.

Old files as turning tools?

I was a bit disappointed to see Ernie Conover recommending the use of files to make wood-turning scrapers (Q&A: "A turner's basic tool kit," *FWW* #199). Files are really too brittle to use that way safely. I have had enough files break on me to be rather leery of using them as turning scrapers unmodified.

If you want to use a file, temper it first at about 400°F in a kitchen oven for about 20 minutes, then quench it in water. Another method is to grind the file so the steel is bright, then heat it with a torch until you see a straw-colored oxide coating begin to form, and then quench it.

Another disadvantage of using old files is the amount of grinding that must be done to eliminate the teeth, which will either score or catch on your tool rest.

Better sources for steel to use for scrapers are old, inexpensive pin or taper punches (often available in sets), cold chisels, pry-bars, or rock-drilling bits.

—BRADFORD J. CHAUCER, Sneads Ferry, N.C.

Ernie Conover replies: As a standard disclaimer, I always used to caution people to anneal files, and Palmer Sharpless and Rude Osolnik would laugh

at me. Secretly, I had probably only once annealed a file. Since then I (and my students) have made several hundred scrapers out of all manner of files. I have never had one break at the lathe, or seen it happen.

As for smoothing the surface, it takes only seconds to dull the offending teeth. They don't have to be removed completely.

If Mr. Chaucer is breaking files, the problem may lie with his scraping technique. A turning scraper is ground to, or burnished to, a burred edge and always used downhill—that is, at a negative angle. It is the dragging burr that does the cutting. The redeeming quality of a scraper is that when it does catch, it simply pivots away from the work.

That said, I only make small scrapers from files, and use them at a very short extension from the tool rest. And I agree that a stronger scraper can be made from a large cement-breaking chisel for an electric impact tool, bought for less than $30 at a home center. Grind it to a dome shape and you have an excellent bowl scraper that is easily canted to keep it downhill in any situation. This tool can be improved by grinding the shank to fit a piece of steel water pipe as a handle, then using epoxy to glue the tool into the pipe. To really soup up the scraper, fill the pipe with lead shot to give the tool more inertia.

YOUR TAKE

What do you use to sharpen planes & chisels?



40%	Waterstones
20%	Sandpaper on glass
9%	Slow-speed grinder
8%	Oilstones
7%	Diamond stones
14%	Most or all of the above
1%	Other

In our eLetter, we poll readers on new questions each month. Sign up for the free newsletter at FineWoodworking.com.

Correction

In the Q&A item "A turner's basic tool kit," (*FWW* #199), the labels for the ½-in. bowl gouge and the ½-in. spindle gouge were swapped mistakenly.

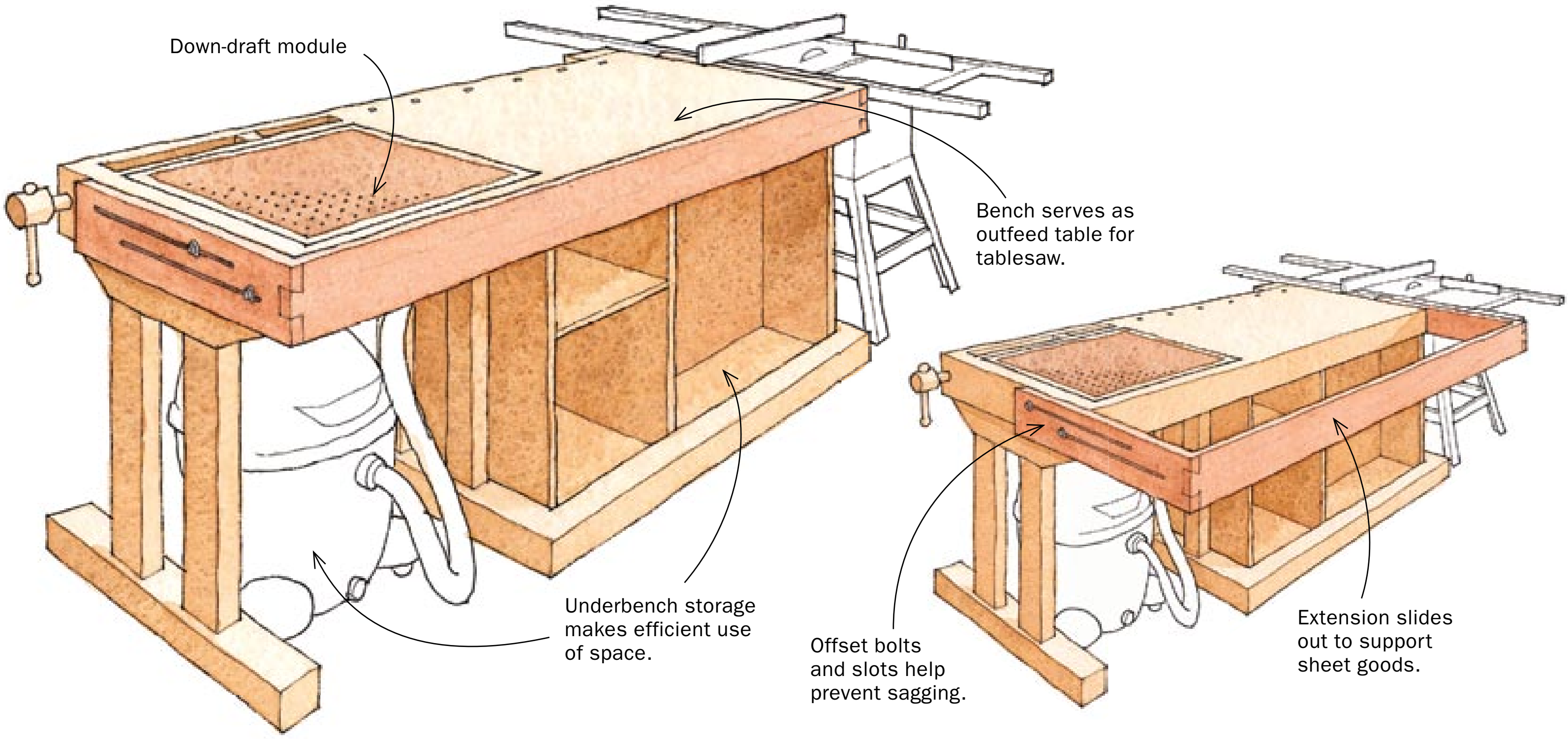
About your safety

Working wood is inherently dangerous. Using hand or power tools improperly or ignoring standard safety practices can lead to permanent injury or even death. Don't perform operations you learn about here (or elsewhere) until you're certain they are safe for you. If something about an operation doesn't feel right, find another way. We want you to enjoy the craft, so please keep safety foremost in your mind.

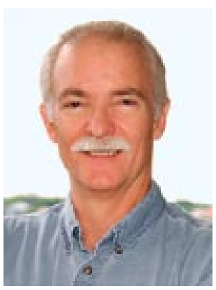


methods of work

EDITED AND DRAWN BY JIM RICHEY



Best Tip Multipurpose workbench is a space saver



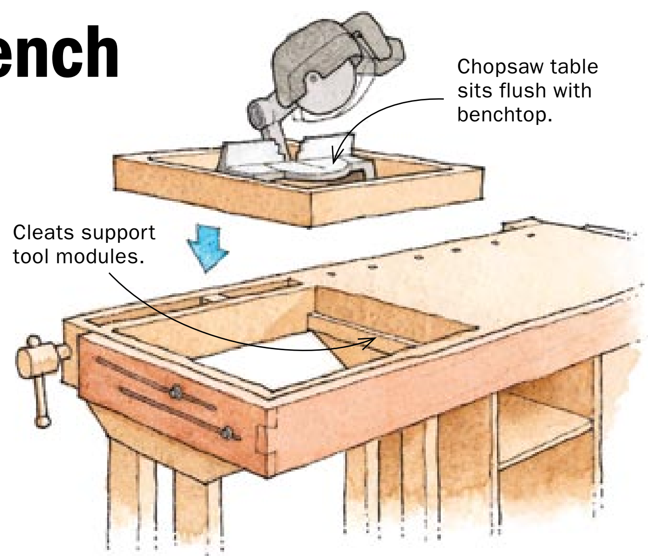
Philip Wilson started woodworking in seventh-grade shop class, building boxes and spice racks. Since then, he's moved on to bigger and better things, building half of the furniture in his home, but he still makes the occasional box for friends or family.

My entire shop must fit into half of my garage, so I have to make the most of the available space. Toward that end, I've built a workbench that also serves as an outfeed table for my tablesaw, and a power-tool workstation with interchangeable modules.

When in outfeed-table mode, I increase the support area for sheet goods by sliding out an extension. This dovetailed, U-shaped frame attaches to the apron of the bench. Slots in the front and back of the extension allow it to slide open 16 in.

At the far end of the bench, I've built a square opening that's designed to receive one of four tool modules: a down-draft sanding platform, a chopsaw, a bench grinder, or a router table. Cleats inside the opening support the modules when they are dropped in. I built the chopsaw module so that the table of the chopsaw is even with the top of the workbench. My default is to keep the down-draft module in place because it does not interfere with the tablesaw or other operations on the workbench. When the modules are not in use, I store them in a rack on the back wall of my shop.

—PHILIP WILSON, Buda, Texas



Grooved clamping blocks for panel glue-ups

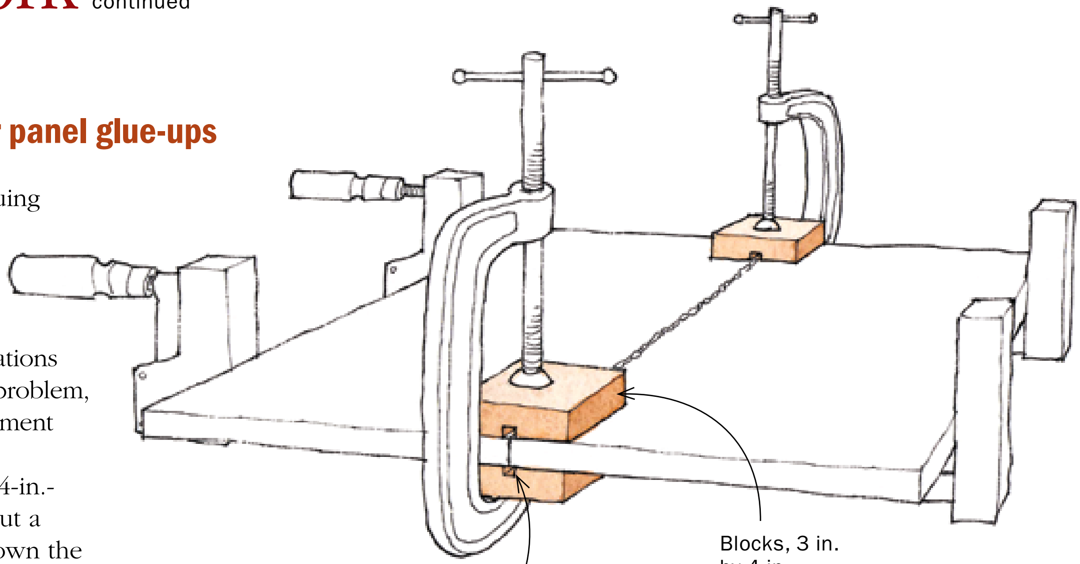
A common procedure while edge-gluing several boards into a panel is to use clamps at the joints to align the boards. But this often allows glue to get trapped under the clamp head, which creates some sticky situations and difficult cleanups. To avoid this problem, I use grooved blocks under the alignment clamps.

To make the blocks, I start with a 4-in.-wide piece of ¾-in.-thick scrap. I rout a ¼-in.-wide by ¼-in.-deep groove down the center, then cut 3-in.-long blocks from that workpiece.

During glue-up, I place one block above and one block below the glueline, with the grooves straddling the joint so that no glue touches the blocks.

When the glue starts to set, after 30 minutes or so, I remove the blocks and peel the soft glue off the joint with a chisel.

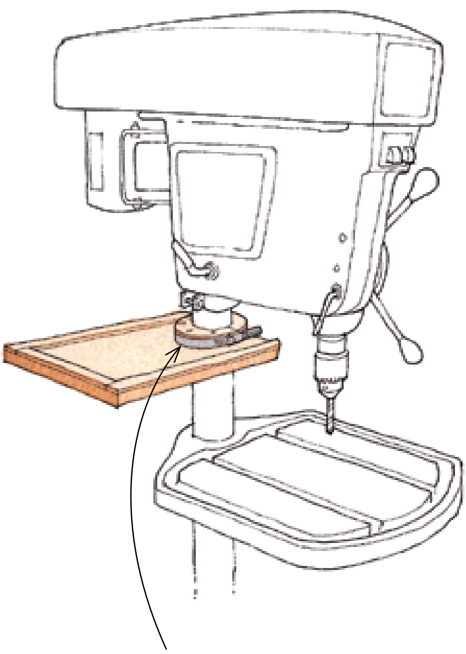
—ROBERT HONEYCOMBE, Kitchener, Ont., Canada



Quick Tip

Tightening and loosening bar clamps has been getting more difficult with arthritis creeping into my hands, so I've started to use one of those rubber pads made to grip and open jar lids. This kitchen accessory gives an excellent grip on the clamp's handle.

—FORREST McCREADIE, Vancouver, Wash.



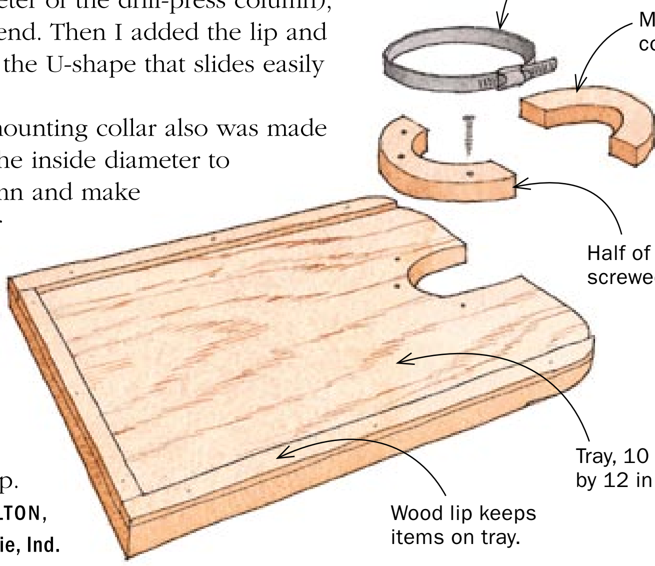
Easy-access shelf for drill-press accessories

This shelf, made from ¾-in.-thick Baltic-birch plywood, keeps bits and other accessories for my drill press close by and prevents them from rolling off onto the floor.

After cutting the tray to size, I used a circle cutter to make a 3-in.-dia. cutout (to match the diameter of the drill-press column), centered 1½ in. from the end. Then I added the lip and trimmed the end to create the U-shape that slides easily over the column.

The two-part plywood mounting collar also was made using a circle cutter. Size the inside diameter to match the drill-press column and make the outside radius ¾ in. or 1 in. larger. One half of the collar is screwed to the tray, aligned with the inside edge of the cutout, and the other half fits around the column. The assembly is held fast with a hose clamp.

—BRUCE MELTON, Rolling Prairie, Ind.

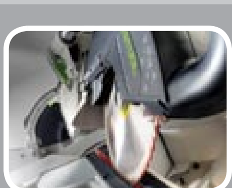




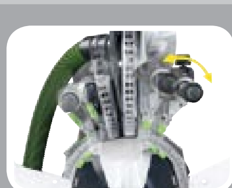
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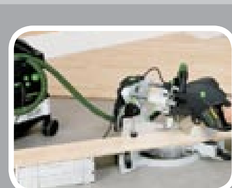
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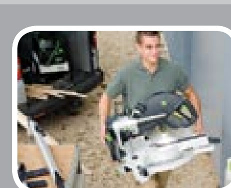
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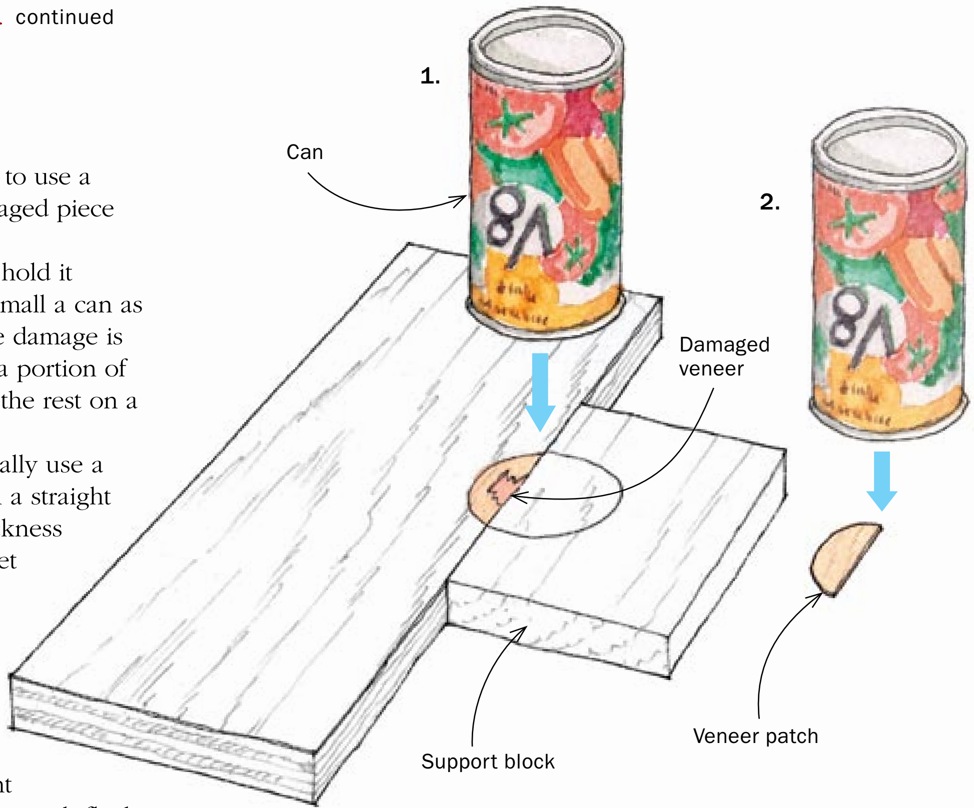
Repairing veneer with a can

A good way of repairing damaged veneer is to use a metal can to guide identical cuts in the damaged piece and in the veneer sheet for the repair.

Place the can over the damaged area and hold it securely while you cut a crisp line. Use as small a can as possible to keep the repair area small. If the damage is on the edge or end of the piece, just place a portion of the can over the damaged area, supporting the rest on a scrap of wood.

To clean out the damaged section, I typically use a chisel, but you also could use a router with a straight bit set to make a cut that's equal to the thickness of the veneer. Now, place the can on a sheet of veneer that matches the grain of the workpiece, and cut around it to make the patch. Trim the patch if the repair is on an edge, then glue it in place. Clamp the veneer in place using a wood block as a caul, with a piece of wax paper between the repair and the block to prevent the block from sticking. When dry, sand the patch flush.

—JOE KAYE, Phenix, Va.

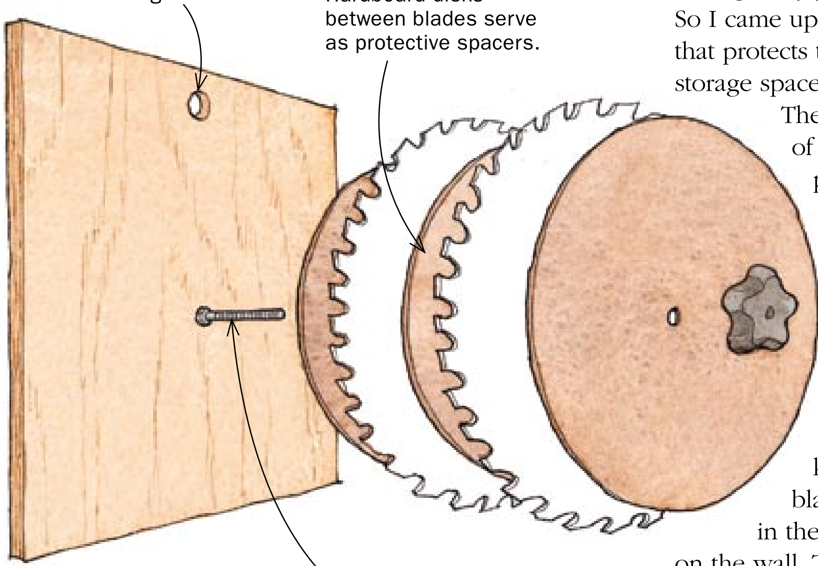


Quick Tip

I inspect my lumber before I run it through the jointer or planer, looking for any grit or metal. So I was surprised to suddenly get a chip in my jointer blades. After looking more closely, I realized that the end of the plank had a few small grains of sand in it, probably picked up while it was standing on end in the lumberyard. Now I make it a practice to cut off about ¼ in. from both ends, just to be safe.

—TOM KOVARIK, Grayslake, Ill.

Caddy keeps sawblades organized



Sawblades are expensive and easily damaged by poor storage and handling. So I came up with a sawblade caddy that protects the blades while minimizing storage space and permitting transport.

The caddy is simply a piece of ½-in.-thick Baltic-birch plywood with a ¼-in.-dia. carriage bolt protruding from the front. I place the blades over the bolt and separate them with ⅛-in.-thick hardboard disks, which I cut on the bandsaw using a circle-cutting jig. A large, threaded knob holds the stack of blades securely. I drilled a hole in the top of the caddy to hang it on the wall. The caddy gets heavy with all the blades, so use a large screw that is well secured into a stud.

I have two caddies, one for 10-in. blades and one for 7½-in. blades.

—BRUCE HARDING, Winnipeg, Man., Canada





READER SERVICE NO. 115



READER SERVICE NO. 53

tools & materials

■ ACCESSORIES

Beefy bandsaw fence adjusts with precision



LAGUNA RECENTLY INTRODUCED A NEW BANDSAW FENCE called the Drift Master. It fits any 14-in. to 24-in. bandsaw, no matter the manufacturer, though some models require that you drill a pair of holes in the front of the saw table. After giving the fence a good workout on my 14-in. Jet bandsaw, I discovered several appealing features.

It's surprisingly easy to adjust the angle of the fence to account for blade drift. Just release two lever clamps and rotate a star wheel to set the fence to an angle that eliminates drift.

With a generous length of 31½ in., the Drift Master offers a good measure of support when cutting long pieces. Also, the fence has two height options and it's easy to change from one to the other. When resawing wide stock, the tall (4-in.) fence offers extra vertical support during the cut. But when ripping thin, narrow stock, the short fence lets you position the blade guides and blade guard close to the stock for improved safety and blade support.

Especially useful is a crank handle that turns a feed screw to micro-adjust the fence left or right when the workpiece needs to be cut to a precise thickness. I can't count the number of times I've been cutting tenons on the bandsaw, edging the fence over with gentle taps, only to have it move when I tighten the locking handle. The Drift Master offers the ability to edge up on the cut with absolute precision. One rotation of the handle moves the fence 0.07 in. Index marks allow for even finer adjustment.

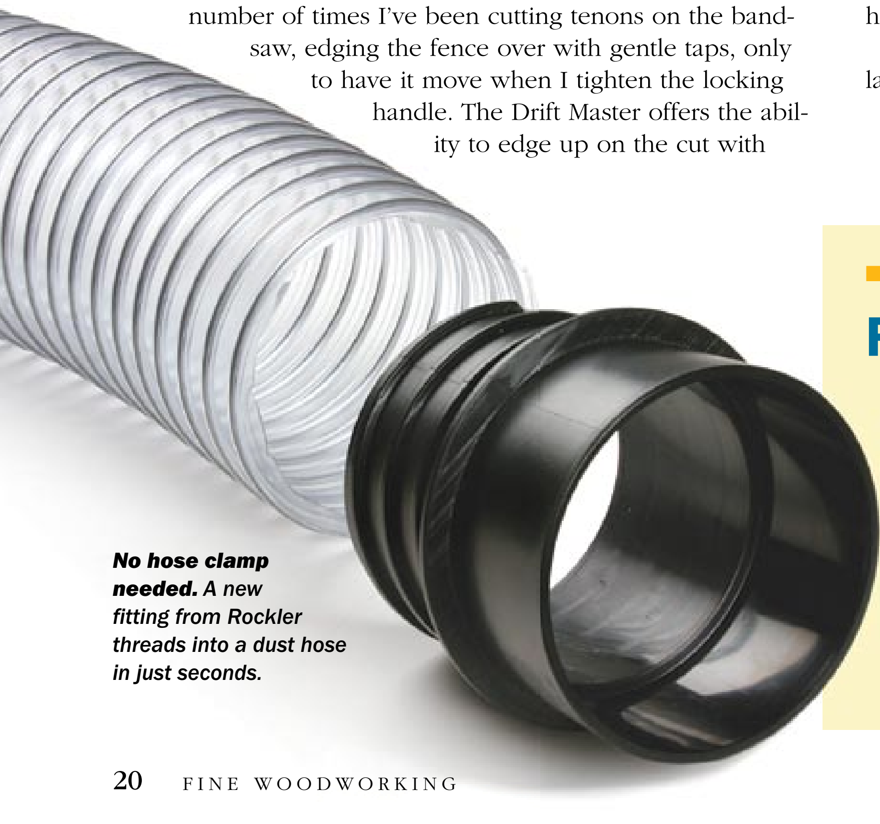


Bandsaw fence is unique. *Laguna's new fence fits most bandsaws, and it adjusts easily for drift and distance to the blade.*

You can also get veneers of identical thickness by cutting each slice to the right of the blade, and turning the micro-adjust handle the same amount after each cut.

The Drift Master sells for $400. For more info, go to www.lagunatools.com, or call 800-234-1976.

—Roland Johnson is a contributing editor.



No hose clamp needed. *A new fitting from Rockler threads into a dust hose in just seconds.*

■ DUST COLLECTION

Fitting quickly screws into 4-in. dust hose

NO NEED TO FUSS WITH A METAL HOSE CLAMP when attaching this 4-in. dust-port fitting to flexible dust hose. Rockler now offers a plastic fitting with an end that simply threads into the hose. The fitting attaches in seconds and stays securely in place. It's Rockler No. 37789 and sells for $7.69. For more information, go to www.rockler.com.

—Tom Begnal is an associate editor.

Photos, except where noted: staff; this page (top two): Roland Johnson



Portable and powerful. *With a 2½-hp, 230-volt motor, Oneida's portable dust collector has plenty of power.*

DUST COLLECTION

Oneida rolls out a portable cyclone

THE NEW ONEIDA PORTABLE DUST COLLECTOR offers the power and efficiency of a large cyclone collector in a compact, roll-around unit. Powered by a 2½-hp, 230-volt induction motor, it moves a respectable 780 cu. ft. of air per minute, according to Oneida. A 15-ft.-long, 5-in.-dia. flexible hose is included with the unit.

To reduce top-heaviness and keep the height of the collector reasonably short at 62½ in., Oneida placed the motor and blower in the center of the machine and fed the airflow into two smaller cyclones that flank the blower. Each cyclone has a 17-gallon drum and a high-quality pleated canister for final filtering. According to the manufacturer, the pleated filters capture 99.9% of dust from 0.2 microns to 2 microns.

The dust collector ships disassembled, but it went together easily. You'll need to add a plug to the end of the cord. The fit and finish were impressive, truly industrial grade.

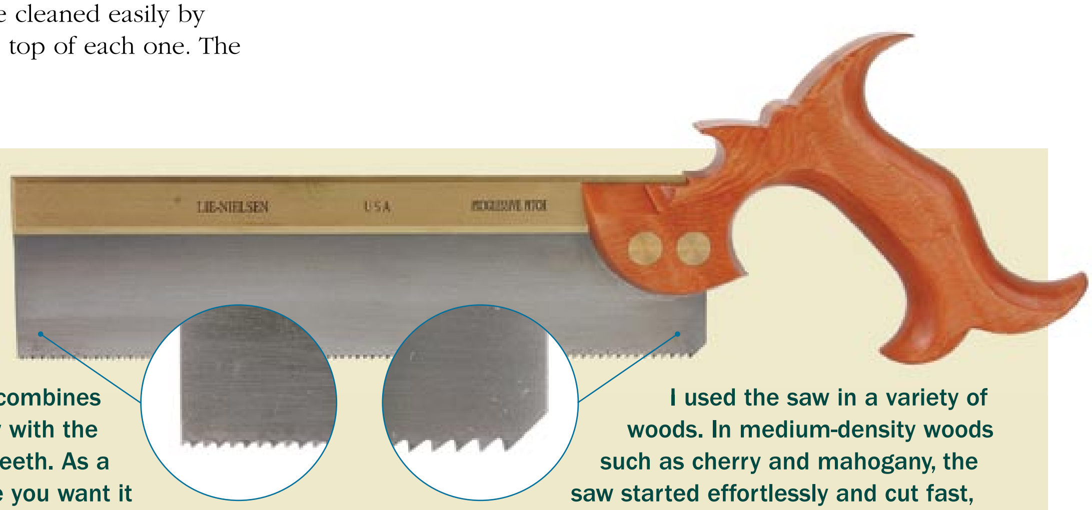
In use, the power of the machine was evident. It could handle the chips from a 12-in. thickness planer while simultaneously picking up the finer sawdust from a tablesaw with no visible dust left anywhere. The pleated filters are cleaned easily by occasionally turning crank handles at the top of each one. The barrels weren't as easy to empty as I would like, but they are no worse than any other dust collector I've tested.

At $1,200, the Oneida Portable is a hefty investment, but given its quality and performance, the price isn't unreasonable. Go to www.oneida-air.com for more information.

—John White is the former shop manager at Fine Woodworking. *He lives in Vermont.*

HAND TOOLS

Dovetail saw has progressive pitch



A NEW DOVETAIL SAW from Lie-Nielsen combines the easy-start feature of a fine-tooth saw with the aggressive cutting advantage of coarse teeth. As a result, it's easy to place a cut right where you want it and, once started, quickly complete it.

You need only look at the teeth to find the secret. At the toe of the saw, the teeth are spaced at 16 points per inch (ppi), a relatively fine number. At the heel, the spacing is a coarser 9 ppi. The idea is to start cuts with the toe of the saw, and complete them with the rest of the blade.

The saw is 14 in. long, with a 9-in. blade filed as a ripsaw. It has 1⅝ in. of usable blade below its brass back. The saw's handle is made of curly maple that is gracefully sculpted and very comfortable to hold.

I used the saw in a variety of woods. In medium-density woods such as cherry and mahogany, the saw started effortlessly and cut fast, smooth, and straight. There was no tendency for the saw to drift in the cut.

In harder woods like white oak and hickory, the saw was equally easy to start but the cut was a bit rougher and the coarse teeth felt a bit more pronounced. I found that by using a very light touch and taking most of my weight off the saw, the cut was much smoother. Ths saw sells for $135. Go to www.lie-nielsen.com for more information.

—Chris Gochnour builds furniture and teaches woodworking in Murray, Utah.


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■ BLADES

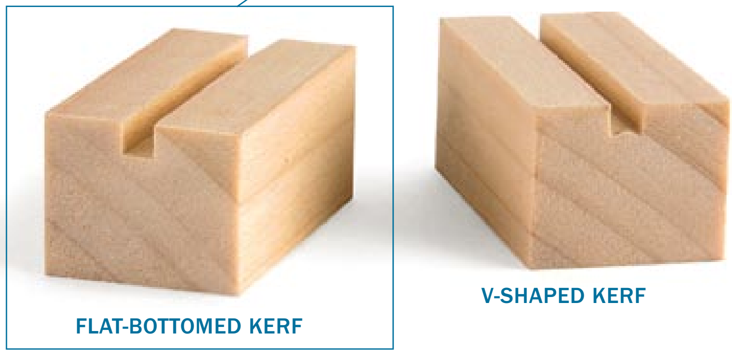
Square-kerf sawblade great for joinery

AS A BOXMAKER, I CUT A LOT OF EXPOSED SLOTS for miter splines. When I use a typical crosscut or combination tablesaw blade, the bevel angle on the end of each tooth produces a kerf with a shallow, inverted V-shape at the bottom. When a spline is added, the V-shape prevents the parts from making full contact. The result is a couple of shallow gaps that make the joint look less than perfect.

A rip blade makes a flat-bottomed cut. But tearout is often an issue when using a rip blade on crosscuts.

Recently, I learned that Forrest Manufacturing is offering a custom-ground version of its venerable Woodworker 2 blade that cuts a flat-bottomed kerf. I tested it cutting keyed miter slots in exotic woods. The blade made dozens of flat-bottomed cuts with no tearout. It would also be of value when cutting box joints. The blade (part No. WW10401125) sells for $120. For more information, contact Forrest at www.forrestblades.com or 800-733-7111.

—Doug Stowe builds boxes in Eureka Springs, Ark., and is the author of Basic Boxmaking *(The Taunton Press, 2007).*



Mind the gaps. *A new blade from Forrest Manufacturing cuts a flat-bottom kerf (left) for gap-free joinery. A groove cut by a typical combination blade produces an inverted V-shape (right).*



■ MATERIALS

Remarkable plastic panels

A RELATIVELY NEW COMPANY, CALLED 3FORM, has developed a method for making plastic-resin panels that offer amazing colors, patterns, and textures. Woodworkers with an unconventional eye will put this product to use as case panels, door panels, and even tabletops, creating a wide variety of effects.

The patterns are made from natural materials such as grass and leaves, and other materials such as crushed glass, lace prints, and transparent fabrics.

Tablesaw cuts (I used a combo blade) were a breeze. I had no trouble using a carbide router bit to add an edge profile. And, with my block plane in hand, it took just a few passes to soften a sharp edge. I found that 3form holds screws well, but to avoid splitting, it's important to predrill and countersink. It can be glued to itself, wood, and other materials. For information on adhesives, go to www.3-form.com.

The product is available in 4-ft. by 8-ft. sheets in thicknesses from 1⁄16 in. to 1 in. Pricing depends on thickness, color, and pattern. For more information go to the 3form Web site, where, by the way, you can order offcuts at a fraction of the regular price. Just click your way to the reclaim department.

—Anissa Kapsales is an associate editor.



A plastic that complements wood. *New plastic-resin panels from 3form open up all sorts of design options, as seen on the doors of this cabinet by Mark Cwik.*

Photo, bottom right: Mark Cwik



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fundamentals

Get safer, cleaner cuts on your tablesaw



ZERO-CLEARANCE INSERTS ARE A SMART UPGRADE

BY TOM BEGNAL

The throat plate supplied with your tablesaw likely has a blade opening that's much wider than the blade. This allows you to easily set the blade at an angle, but it also has some serious drawbacks. First, because there's no support under the workpiece near the blade, tearout often occurs along the edge of the cut. Second, narrow offcuts can get wedged in the gap and then thrown back at you.

To overcome these problems, make a plywood insert that fits into the throat. Then raise the blade through the insert to create a zero-clearance opening. Because the opening fits the blade, tearout is eliminated and offcuts can't get wedged.

Making a zero-clearance insert isn't difficult. You can make several at a time, so you can have one ready for any blade setup. Before you begin, a word of caution: Tablesaw throat design varies by model. So check yours and adjust the steps as needed. Make the inserts from ½-in. birch plywood. It's stiff and strong, and it won't change in width as

Good



Clean cuts. *A zero-clearance opening eliminates tearout because the workpiece is supported next to the blade.*

Bad



Rough cuts. *One cause of tearout on the lower edge is a lack of support directly under the workpiece. Most of the throat plates supplied with tablesaws have a wide gap around the blade.*

Ugly



Dangerous cuts. *Narrow offcuts can fall into the gaps on either side of the blade. If you're lucky, the blade won't launch a trapped offcut back at you.*

INSERTS FOR ANY SETUP

Shopmade inserts are inexpensive and easy to make. So there's no reason not to have one for common blade setups, like the dado widths you use most often.

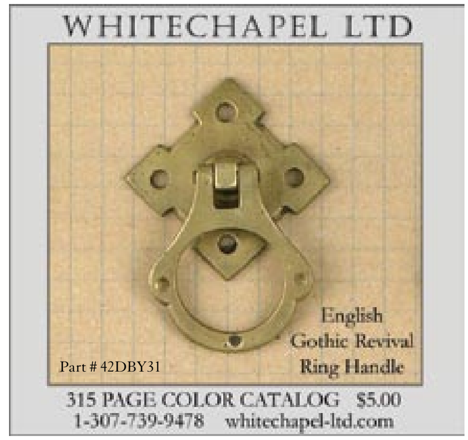


Photos: Matt Kenney



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Make the blank

Once you have an oversize rectangular blank, you'll need to bandsaw it to rough shape and then rout it flush to the throat plate supplied with your saw.



Throat plate becomes template. *Attach the throat plate to the blank with double-sided tape.*



Round the ends. *A bandsaw does this best, but a jigsaw also works. Leave about 1⁄16 in. of extra material.*



Trim the blank. *Rout the insert flush to the throat plate with a bottom-bearing, flush-trimming bit.*

the shop's humidity fluctuates. This means it won't get stuck in the opening in the summer or become too loose in the winter. Also, many saws are designed for a ½-in.-thick throat plate, or very close to that.

Make a blank with round ends

Use the tablesaw and rip fence to cut a piece of plywood ⅛ in. wider than the saw's throat plate. Then use the miter gauge to crosscut it 1 in. longer than the plate.

Center the throat plate on the blank and attach it with double-sided tape. Next, using the throat plate as a guide, round the ends of the blank with a bandsaw or jigsaw, leaving about 1⁄16 in. of waste. Trim the waste with a router and a bottom-bearing, flush-trimming bit. A router table makes this easier, but a handheld router can be used. In either case, the bearing runs against the throat plate as the bit trims the waste.

On the router table, feed the insert into the bit from right to left. Keep the bearing on the throat plate and work your way around. Skip over the blade-guard opening, or the bearing will fall into it and cause kickback. You'll get rid of that waste when you cut an opening for the guard assembly.

With a handheld router, rout from right to left. After you rout the first side and end, rotate the blank 180°. Then rout the second side and end.

Cut the blade and splitter openings

You're now ready to cut an opening for the blade. Crank the blade to its lowest position and insert the saw's throat plate into

Cut the openings



Don't remove the blank. *Even at its lowest height, a 10-in. blade prevents a blank from dropping into the throat. So you'll want to cut the blade opening while the blank is taped to the insert.*





Two openings to cut. *Hold down the blank with a push stick (left), staying away from where the blade will come through. Raise the blade slowly. Afterward, mark the opening for the blade-guard assembly (above) and cut it with a bandsaw or jigsaw.*

Shim a low insert



Check for level. *The insert should be flush with the saw table. Use a steel ruler to check for high and low spots.*



Easy fix for low spots. *The plate is supported by a lip or tabs in the saw's throat opening. Apply tape to the low spots to raise the insert flush with the saw table.*

the throat. Slowly raise the blade until it's roughly ½ in. above the insert blank.

Now, cut an opening for the blade-guard assembly. Use the throat plate as a template to mark the opening on the insert, separate the insert blank from the throat plate, and then remove the waste with a bandsaw or jigsaw. Next, bore a finger hole with a 1-in.-dia. Forstner bit. This hole makes it easier to remove the insert.

Check for level

Typically, the throat plate is supported by a small lip or tabs inside the tablesaw throat. Your insert should be flush to the saw table when it rests on that lip.

Place the insert into the saw's throat and use a straightedge to test for level. An insert that's too low is easy to fix. Just add some painter's tape at the low spots to raise it up.

An insert that's too high needs a rabbet routed around its underside. It should be wide enough to clear the lip and deep enough to bring the insert flush with the saw table.

Use a router and a bearing-guided rabbeting bit to cut the rabbet. Rout no deeper than 1⁄16 in. on each pass.

Install a "lock"

It's important to add a "lock" at the back so the blade won't lift up the throat plate. A fender washer attached in a recess on the underside of the insert makes a good lock. The washer slides under the throat's edge and prevents it from pulling up.

This may not work for your saw. Some throats require a pin-sized arm that sticks out the back of the insert. If yours does, then use either a brad nail or screw as a lock.

Add a few coats of shellac or varnish to give the insert a smooth surface and some wear protection. □



Two types of locks. *On some saws, a fender washer fits under the throat's edge. Others need a brad or screw.*

Rabbet an insert that's too high

Lowering an insert is a three-step process: Determine the depth, mark the depth, and cut the rabbet.



A precise measurement. *With the blank in the throat, use a combination square to find how deep the rabbet needs to be.*



Lay out the cut. *Slide the square against the bottom of the insert and mark a line around its edge.*



Cut to the line. *Take 1⁄16-in. passes with a rabbeting bit, and check the insert in the throat after each pass. If you take off too much, just use tape to raise it up.*





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5 Essential Jigs for the Router Table

Great fixtures and fences offer better control and new possibilities

BY PETER SCHLEBECKER

In a recent article, I wrote about the router table I built for the Center for Furniture Craftsmanship ("Rock-Solid Router Table," *FWW* #195), the school where I teach and manage the facilities. The primary goals of the design were sturdiness and a tabletop big enough to handle a wide array of workpieces and jigs. That article was about making the table; this one is about the accessories that go with it.

Easy to make and use, these five jigs and fixtures are some of the most useful router-table jigs at the school. With them, we repeat shapes consistently, quickly, and precisely. We make stopped cuts in angled workpieces, creating invisible and strong joinery. Profiling narrow stock is easier and safer. Edge-jointing a stack of veneers can be done effortlessly.

Of course, if you don't have a router table like mine, you still can use these jigs. But if your table surface is small, you may have to scale down the jigs accordingly.

Online Extra

To watch Peter Schlebecker make and use these router jigs, go to **FineWoodworking.com/extras.**

Peter Schlebecker teaches at the Center for Furniture Craftsmanship in Rockport, Maine.



1 Featherboard

MANAGE SMALL AND NARROW WORKPIECES

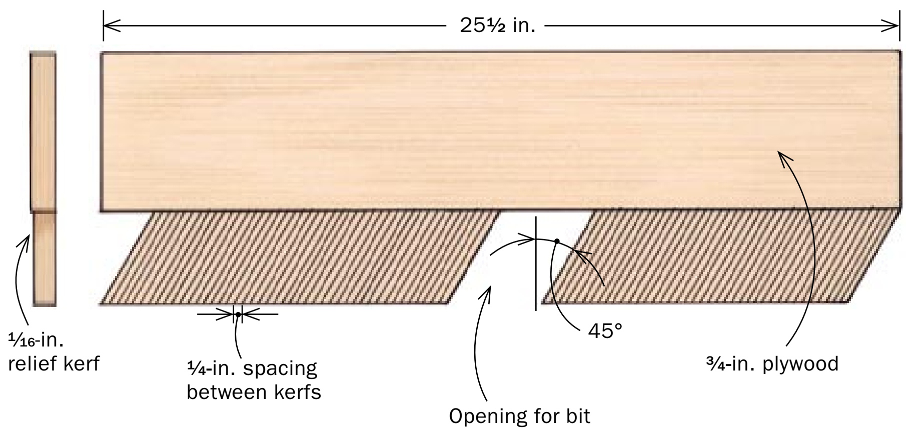
Also called a finger board, this simple fixture holds a workpiece firmly against the table surface while a cut is made. It is particularly important to use if the workpiece is very narrow and there is a risk of getting your fingers too close to the blade. I use a featherboard for a pencil bead or for any other small molding, such as the slightly curved profile on dozens of pieces for a tambour door.

The configuration that works best for the router table is a long piece of ¾-in. plywood that is about the same length as the router-table fence, with feathers cut on both sides around a notch for the bit. Plywood is strong in every direction, so it allows you to orient the feathers along the side of this long board. Lay out pencil lines at 45° with ¼-in. spacing, and then cut the feathers on the bandsaw. The kerf will leave feathers about 3⁄16 in. thick, small enough to flex well but still be strong.

To use the featherboard, put the workpiece on the table, apply light, downward pressure to the featherboard, and mount it to the fence with two clamps.



Safe and accurate. *Featherboards are great for holding workpieces down, but they do not allow the workpiece to back up. If there is a problem in the middle of the cut, either stop the router or just keep pushing the piece through. Use a thin push stick near the bit.*



CUT THE FEATHERBOARD IN PLYWOOD



1 ***Reduce friction between the feathers and the fence.*** *Before cutting the feathers, narrow the fence side of the plywood with a shallow cut, about 1⁄16 in. thick.*



2 ***Freehand the feathers on the bandsaw.*** *First, remove the cutout for the bit, and then cut the feather lines.*

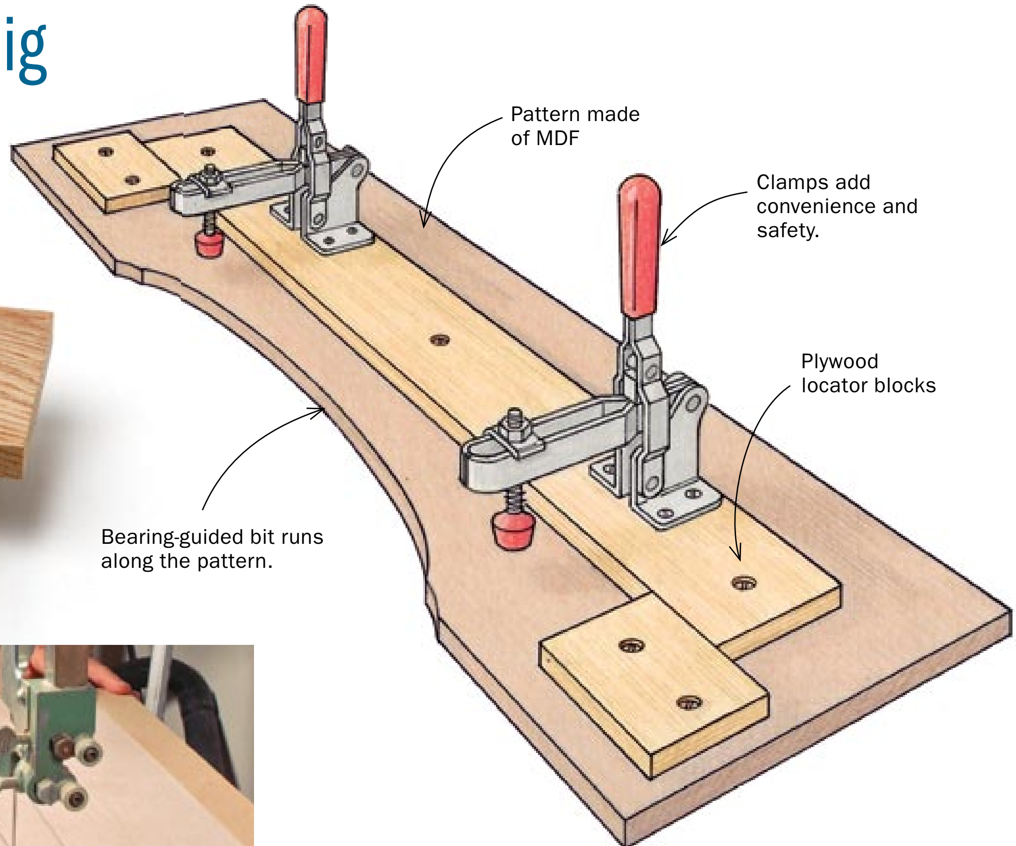


3 ***Put on the pressure.*** *To have an effective hold-down that still allows the piece to move along smoothly, keep a little downward hand pressure on the featherboard while you clamp it in place.*

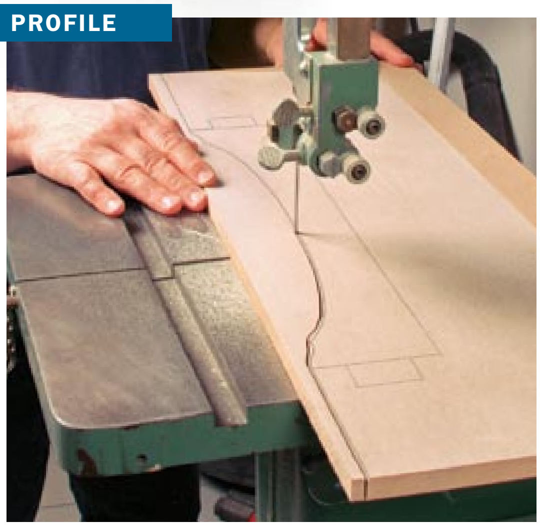
2 Pattern-routing jig

FAST, PRECISE, AND EASY MULTIPLES



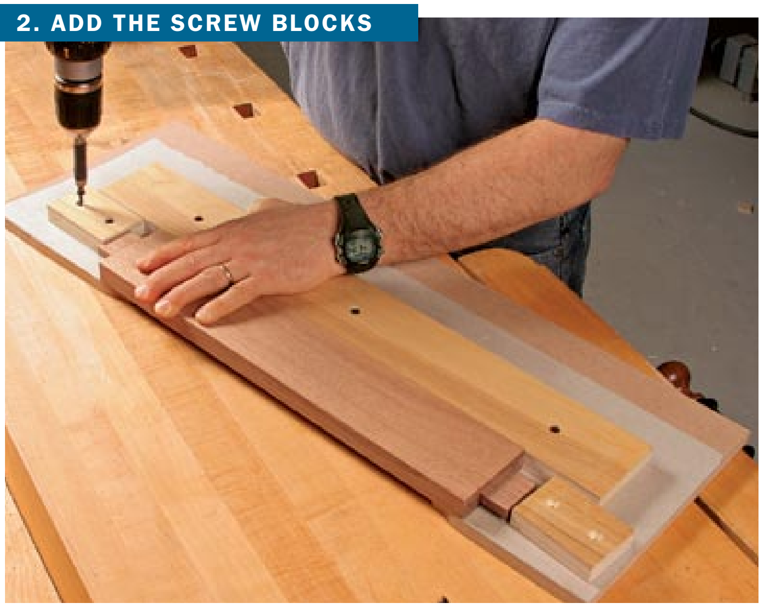


1. CREATE THE PROFILE



Make the pattern jig. *Draw the shape on tracing paper and glue it to MDF. Bandsaw close to the line, and then fair the curve to the line with a spindle sander or a block and sandpaper.*

2. ADD THE SCREW BLOCKS



Position the blank and draw the shape. *With the blank correctly located on the jig, screw locator blocks behind and on each end of the blank. Consider adding toggle clamps for extra control.*

The most common use of the router table in our shop is pattern-cutting. Used for curved legs, aprons, or multiples of any kind, pattern-cutting is when a part is cut out using a bearing-guided, flush-trimming bit. The piece is roughed out slightly oversize on the bandsaw and mounted to the pattern. The bit then follows the pattern, producing the same profile every time.

This particular jig makes pattern-cutting as easy as possible. I've included an extra area before and after the pattern so the bearing has a place to ride as it moves into and out of the cut. I made it easy to locate workpieces instantly, and the toggle clamps hold the work in place and serve as built-in handles.

To make a pattern jig, draw the outline of the shape onto tracing paper, and then use spray adhesive to glue the paper to a piece of MDF. Use a piece larger than the shape so there will be room for toggle clamps, locator blocks, and start-and-stop areas for the bearing. Bandsaw close to the line and clean it up with power- and hand-sanding.

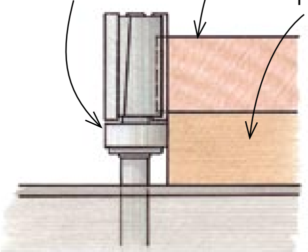
Position a blank on the pattern and surround the blank with blocks to locate it. Then use the jig to trace the shape on the blank. Remove the blank and bandsaw the shape, leaving it about ⅛ in. oversize, and return the workpiece to the jig. I usually install toggle clamps to hold the blank firmly.

When routing, begin the contact with the bearing on the pattern portion ahead of the actual blank. Follow through the cut to the other end; it's always good to take a second pass to clean up any inconsistencies left by sawdust and vibration.

3. ROUT THE WORKPIECE WITH A PATTERN BIT

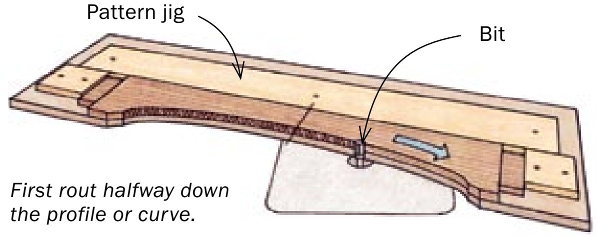


Bandsaw the waste, then rout. *Transfer the pattern to the blank (above). Bandsaw away the bulk of the waste, reinstall the blank in the jig, and rout (right). The bearing-guided bit rides along the pattern.*

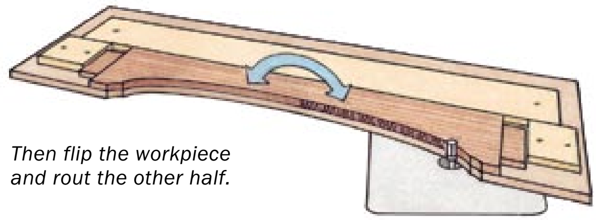




Pay attention to grain direction. A sharp bit can cleanly cut mild reversals in grain, but when the grain is steep and tears out, a symmetrical piece can be flipped in the jig to work the grain in different directions. If the piece is asymmetrical, make a second, opposite jig and flip the workpiece.



First rout halfway down the profile or curve.



Then flip the workpiece and rout the other half.

3 Zero-clearance fence

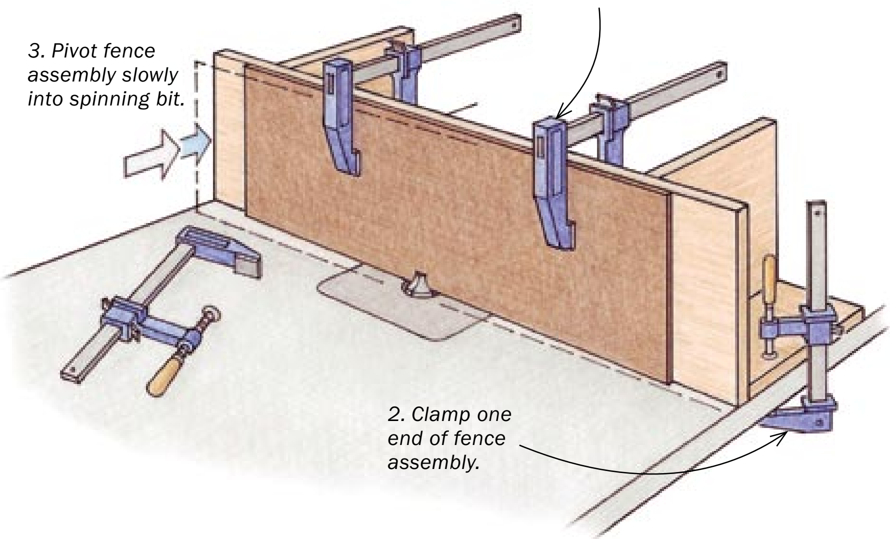
FOR SMALL WORKPIECES

Sometimes workpieces are so short, there is a risk that they will dip into the opening in the fence and cut too deeply, or that the leading edge of the wood will catch the outfeed side of the opening. A zero-clearance fence will prevent these problems and make the operation safer. I use this auxiliary fence anytime I rout a profile around a small drawer front or door. A bearing on the router bit could get in the way of the fence, so if there is a bearing, you'll need to remove it.

The zero-clearance fence clamps onto the regular fence. Make it out of ¼-in. Masonite, about the same size as the regular fence. I use Masonite because it is stiff enough to stay straight near the center when clamped on the ends. After bringing the main fence forward of the bit and clamping on the Masonite, clamp one end of the main fence to the table. With the bit set at the correct height, start the router and then pivot the entire fence so that the bit slowly cuts through the hardboard from the rear. I bring the cutter just a bit farther out than needed and then back it off to leave a little clearance for the blades. This reduces heat buildup and noise. Stop the router, lock down the free end of the fence, and try a test cut.



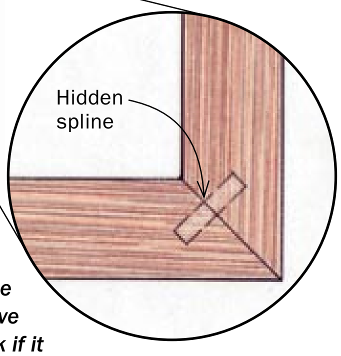
No room for error. *A zero-clearance fence closes the gap around the bit and prevents short work, like this drawer front, from dipping into the open space.*



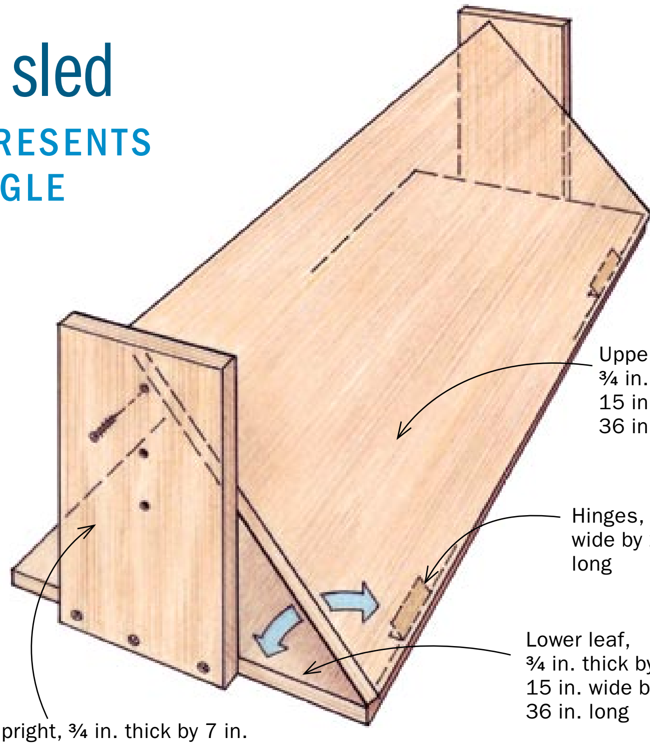
4 Miter angle sled

SIMPLE SLED PRESENTS WORK AT AN ANGLE





Hidden joinery. *An angle sled makes it simple to run a stopped groove into the edges of a mitered carcase, like this one by Seth Deysach, where the groove would show at the front and back if it went all the way through.*



When it is necessary to present a piece of wood at an angle to the router bit, as with a mitered joint with spline grooves in box or carcase construction, this sled makes it easy. Cutting the grooves on the tablesaw is not an option if you want to make stopped grooves, hiding the splines. But this sled, used on the router table with a slot-cutting bit, will do the job perfectly.

Constructing the sled is simple. I make my sled big enough to hold a range of sizes with extra space to screw in hold-down blocks should I need them. Two squared boards of sheet material are held together with inexpensive utility hinges, and end pieces establish the angle. The workpiece is clamped onto the upper leaf so that the leading edge just touches the table surface. Or you can align the side or top edge with marks or stop blocks screwed to the upper leaf. When routing the end of a narrower piece, the upright end can serve as a right-angle guide as long as the components of the jig have been made accurately square.

A router bit can be used with a bearing that will run along the workpiece, as in the case of the slot-cutting bit.





Set up the angle. *Once the leaves are hinged and the uprights are screwed to the lower leaf, use a bevel gauge to set the angle (left), and screw through each upright to lock the upper leaves (right).*





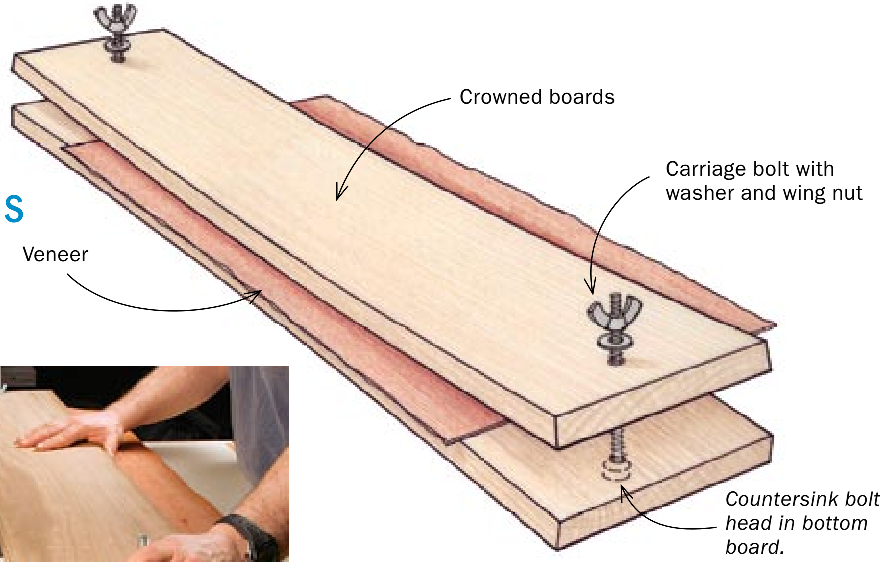
Use the fence as a pivot point for a stopped cut. *With the workpiece clamped on the angle sled and the stopping points taped on the fence, use the fence to pivot into the bit on one end and out on the other.*

Photo, top left: Seth Deysach

5 Veneer jig

JOINT PERFECT EDGES ON A STACK OF VENEERS







Tighten veneers in the jig. *The excess should protrude about ⅛ in. from the edge. Use a flush-trimming bit to do the trim cut. Go slow so as not to chip out highly figured veneers, and take a second pass to perfect the edge.*

Edge-jointing veneers with a handplane can be time-consuming and frustrating. Instead, you can use a veneer-trimming jig to joint multiple leaves of veneer at the same time. I like this jig because it is simple, can handle any width of veneer, and is easy to re-true on a jointer. It consists of two poplar boards bolted together at the ends. For short lengths, two flat boards will suffice. However, for veneers up to about 5 ft. in length, I make a longer jig with a camber in the boards so that clamping pressure is even along the entire length.

To create the camber, square up two 5/4 boards to about 1⅛ in. thick. Set the jointer to take a 1⁄16-in. cut and run the first board over the cutterhead about one-third of the way along the board. Stop the motor, turn the board around, and repeat on the other end, same face down. Repeat this three times on both ends, stopping each time about 4 in. from the end of the previous cut. The board should be tapered on both ends in a series of steps.

Next, flip the board and use a planer to remove the material in the center until the whole board has been planed end to end. A planer won't remove the camber from the board and the steps will not show up on the planed side. Flip the board and take a pass or two to clean up the stepped side. Repeat the process on the other board.

Drill holes for carriage bolts, making sure to countersink the heads and install washers and wing nuts. When the crowns of the boards are pressed against each other, they will force the whole jig to lie flat on the table surface. Lock the assembly down and run both edges over the jointer to true them up, and you're ready to insert veneer leaves and edge-joint them.

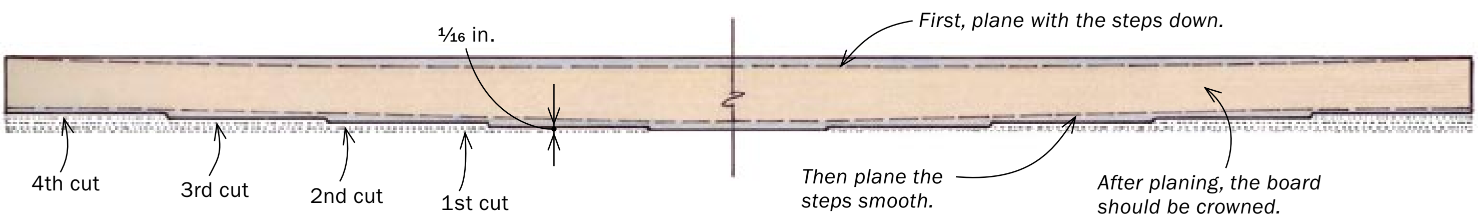
CROWNED BOARDS ARE THE KEY

Start with steps. *Schlebecker takes multiple jointer passes on both ends of the boards, shorter each time. He tapes a mark on the jointer and matches it to lines on the top of the board to know when to pick up the board.*





Plane it smooth. *Next, with the steps facing down on the bed, he runs the board through the planer until the board has been planed across its length. Then he flips the board over and gradually removes the steps.*

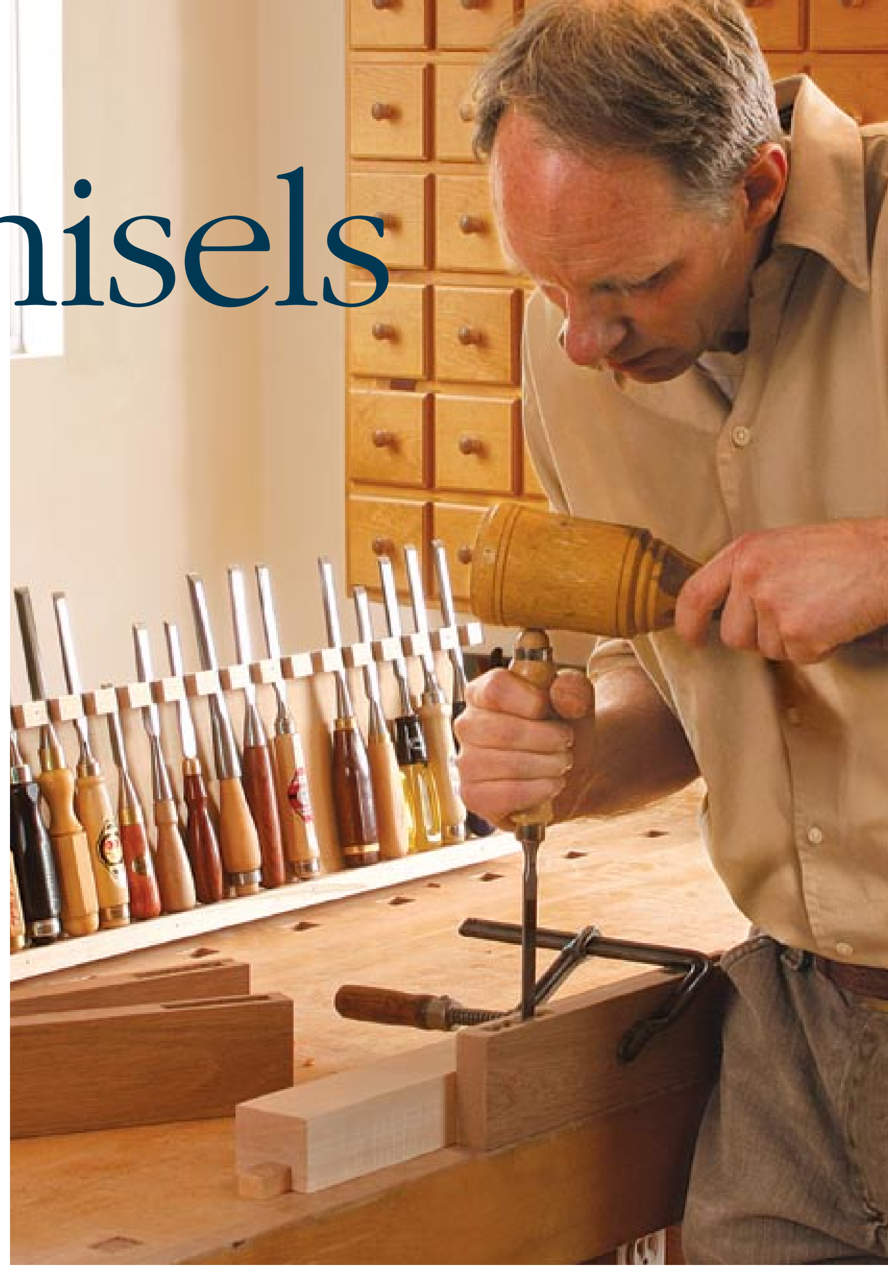


TOOL TEST

Bench Chisels

23 brands go head to head in a real-world test

BY CHRIS GOCHNOUR



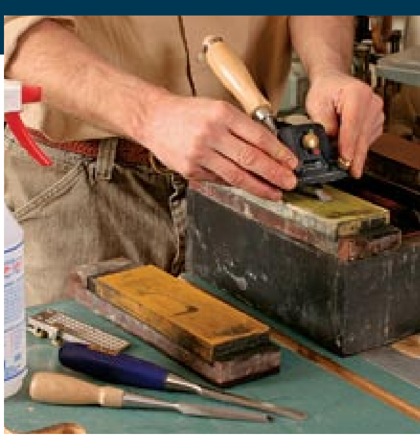
Chisels are the epitome of simplicity: a sharpened steel blade attached to a handle. Yet in spite of their simple form, they possess an astounding amount of utility: They can split, slice, scrape, chop, and pare; they can be held in one hand and driven with a mallet, or used two-handed for controlled paring cuts. They work equally well with hard or soft wood. They are almost indifferent to whether they are working with the grain, across the grain, or on end grain.

You can buy chisels designed for a particular task, such as mortising or paring, but the jack-of-all-trades is the bench chisel. This general-purpose tool is suitable for a broad range of tasks, including dovetailing and mortise-and-tenoning, paring pegs flush, installing hinges, chamfering edges, and even cleaning up glue squeeze-out.

I ran 23 bench chisels through a variety of real-world woodworking tasks to find out which ones excel and which ones come up short. I divided the test into three parts. The first was to examine each chisel out of the box and to record how much work it took to get it ready to cut wood. Second, I evaluated

Prep, then test

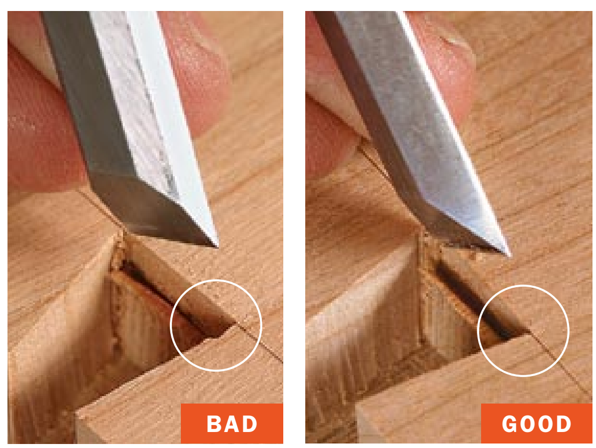
All the chisels had their backs flattened and then were honed to 8,000 grit on waterstones using a honing guide.





The dovetail test. *Gochnour used each chisel to clean up a dovetail joint to test how well it handled light cuts for precision work.*

Dovetailing



Why side bevels are important. *If a chisel's side bevels terminate in large, flat sides, the chisel will not fit into tight corners (left). Chisels with very narrow, flat sides are ideal for getting into dovetails (right).*

Photos, except where noted: Mark Schofield; individual chisel photos: John Tetreault

The right chisel for you

There are many outstanding chisels on the market today. To find your ideal tool, consider a few things: What chisel best fits your style of work? Do you mostly chop, mostly pare, or an equal amount of both? Longer chisels are easier to hold; their greater blade surface gives more leverage and makes for a steady, controlled cut when paring two-handed. Short chisels are easier to control with a fingertip grasp of the blade while driving with a mallet. Consider, too, the amount of prep time you want to invest to get the chisel working, whether it be flattening the back or setting the hoop. You may prefer to spend more money and less time.



WESTERN STYLE

LIE-NIELSEN

This chisel was almost flawless out of the box. Its back was lapped flat and nearly polished, and its beveled edges were milled and tapered precisely. However, it is the tool's size and feel that make this the ideal bench chisel. It is lightweight and balanced, yet stout enough for rugged work, in part due to its socket design. Its mid-range length is great for controlled detail work, yet its blade is long enough for moderate-range paring. The A2 blade's durability found a spot in the middle of the pack, but in spite of this, the ergonomics prevailed.

NAREX

The beech handle, with a hoop and ferrule, is easy to grasp whether chopping with one hand or paring with two. The back of the chrome manganese blade was nice and flat and the edges were beveled sufficiently for excellent dovetailing. The cutting edge held up quite well, and at $6, this is the obvious choice for best value among Western-style chisels.

JAPANESE STYLE

MATSUMURA BLUE STEEL

Made by a Japanese blacksmith who has been hand-forging chisels for 50 years, this blue-steel chisel is finely crafted and was set to go out of the box. The wood in the handle's end is mushroomed to secure the hoop and create a comfortable pad for your hand. The blade held an edge with the best, and is slightly longer than the other Japanese blades. At $50, it's moderately priced for such a high-quality chisel.

GRIZZLY

This chisel is a diamond in the rough. Its back was slightly concave along its length, but this lapped out without much trouble. The end of the handle must be mushroomed over to set the hoop in place, so plan on 30 minutes per chisel for this task. The finish on the handle was a bit rough, but fine sandpaper and steel wool polished it in a minute or two. In use, the tool performed admirably, its edge held up nicely, and at $14, it is a real bargain.



Long blades pare better. *Chisels with short blades, such as Japanese-style ones, are not able to pare as wide a joint as the longer-bladed chisels. Plus, there is less blade to hold with the forward hand for fine control.*



Cleaning up mortises. *To see how well each chisel handled chopping, Gochnour used them to clean up a mortise in white oak.*



Chop till they drop. *To test each chisel's edge retention, Gochnour used them to chop end grain on pine, cherry, and white oak.*

The rest of the pack

Because tool choice is inherently personal, the author's favorites may not be yours. But his observations, and the performance ratings on the following pages, will help you zero in on the right chisel for you.

ASHLEY ILES



This chisel features a boxwood handle in the traditional London pattern with an octagonal central section. The handle is comfortable but slightly large for the scale of the tool. The back flattened and polished with minimal effort, and the side bevels are nicely softened and tapered to a small flat, which is convenient for working into tight corners.

ASHLEY ILES



AMERICAN PATTERN

At 7⅜ in. long, this is the shortest chisel and, due to its size, not the best all-around bench tool. For precision tasks that require holding the chisel in the fingertips, like dovetailing and chopping hinge mortises, it really excels. The beveled edge tapers to an extrathin 0.0025 in., which also favors dovetailing. But the short blade means it is not a good choice for paring.

BARR



Made by blacksmith Barr Quarton in McCall, Idaho, this tool looks and feels handmade—in a good way. It doesn't have mass-produced uniformity, yet it is finely crafted with softened edges. It's a sturdy socket chisel but the socket carries a lot of iron, making the chisel feel top-heavy. With its pedigree, Gochnour was surprised that the edge did not hold up better.

BLUE SPRUCE



This chisel is absolutely beautiful and impeccably crafted. The back of the A2 steel blade was dead-flat right out of the box. Its beveled edges taper to a sharp 0.0010 in.—fabulous for dovetailing, yet tricky to hold by its side. The cocobolo handle is the most comfortable of those tested. However, the lack of a bolster and the slightly flexible blade mean you should stick to moderate mallet strikes.

how each chisel felt in my hands and how it performed on dovetail and mortise-and-tenon joints. Last, a stamina test: How long did the edge hold up when chopping end grain? None of us look forward to sharpening, and the longer between sessions the better.

How much work to get a sharp edge?

I lapped the back of each chisel on sandpaper stuck to a granite plate. If the back had heavy milling marks or was not flat, I started with P100-grit; otherwise, I began with P220-grit and progressed to 2,000-grit (CAMI grade). After the back was polished, I honed the bevel to 30° using a honing guide. For the Japanese-style chisels and those chisels with A2 steel blades, I used an angle of 35°, recommended for these harder and more brittle steels. Using waterstones, I progressed from a 1,000-grit stone to an 8,000-grit stone. Using this sharpening system, I didn't notice that the harder steel of the Japanese or A2 chisels took longer to sharpen.

How does the chisel feel and how does it cut?

The ideal bench chisel should have good balance (in other words, the blade-to-handle weight should feel natural) and a comfortable

HIRSCH



The hornbeam handle is straight and slender, making it difficult to push by its end. The blade is nice and polished with no sharp edges, but unfortunately the polisher rounded over the bevel, requiring 1/32 in. to be ground away to get a sharp edge. In spite of these issues, the Hirsch is a high-quality chisel, with good balance and steel that holds up reasonably well.

IRWIN



A carryover from the successful Marples Blue Chip chisels, Irwin chisels would make a great starter set for the cost-conscious woodworker. They're rugged, have nice balance, and the edge retention fell in the middle of the pack. The back was reasonably flat right out of the box, only requiring five minutes to tune up, but the chisel's milled edges were uncomfortably sharp.

LEE VALLEY



This chisel has the feel of a rugged contractor's tool. Its plastic handle is designed to take a beating and the author was impressed by how well the cutting edge held up. The blade's back was quite out of flat and the milled edges were a bit sharp. The side flats are too big for dovetailing.

MHG



The MHG is a well-crafted chisel with a durable handle made from European hornbeam. The chisel was perfect out of the box, with a flat back, softened edges, and a squarely ground bevel. The tool has a real solid feel when chopping, but its edge retention was only average.

SORBY



One of the best-looking chisels, it has a finely crafted boxwood handle with a brass hoop and ferrules and a leather shock washer. The blade tapers nicely and the sides taper to a fine edge, making it great for dovetailing. However, it took 10 minutes to remove a low spot on the back near the cutting edge, and the edge broke down fairly rapidly.

C.I. FALL



The rectangular stained beech handle wasn't the most comfortable, but its sizable end was easy to hit with a mallet. Unfortunately, the handle was twisted in relation to the blade, making it a bit cockeyed in use. The blade's back was flat, but the side bevels terminated with very large flats, making it less than ideal for dovetails.

CROWN



At 10¾ in., this is the largest chisel reviewed, which made it nice for two-handed paring; but its length and small handle end made it tricky to register mallet blows. It has a rosewood handle with a brass ferrule and a nicely polished blade with no sharp edges. Out of the box, the back was flat, but the cutting bevel was ground out of square.

FOOTPRINT



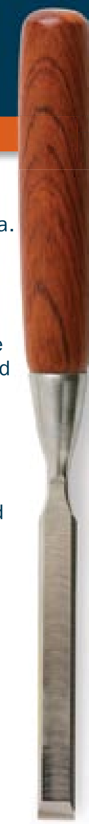
Gochnour really liked the size and shape of this chisel. The blade is long enough for mid-range paring tasks, yet the compact size is perfect for dovetailing and other precision work that requires mallet taps. The cutting edge held up very well despite the budget price ($18). The tool would be better if its side bevels didn't have such large flats and it came in more than four widths.

GARRETTWADE



This is a solid tool that won't disappoint. The handle is stained beech with a hoop and ferrule. The tool is nearly identical to the Narex and with a similar performance, which may mean that they are manufactured in the same facility in the Czech Republic. The only difference was that the GarrettWade chisel required a bit more work flattening its back.

GRIZZLY



The handle is strong and attractive bubinga. The blade's back was flat, but it took a minute to lap out the mill marks. The blade is well ground and the side bevel tapers nicely to a moderate flat. At $5 a chisel, the Grizzly would have represented a great value had the edge not completely given out and stopped cutting before all the tests were completed.

grip, and provide a good target for mallet blows. It should have a blade and handle that are stout enough to withstand moderate blows, yet it should also have refined beveled edges so it can work in dovetail sockets and other confined spaces without obstruction.

Length is an important aspect of ergonomics. The chisels reviewed range from 7⅜ in. to 10¾ in. The longer chisels excel at two-handed paring tasks, but are less ideal for precision work or for tasks in which the chisel is held with one hand and driven with a mallet in the other. Conversely, short chisels are easily controlled, but tend to lack the range and leverage of the longer chisels. To get a feel for the ergonomics of the different chisels, I used each one to dovetail a joint: I selected cherry for the pins and soft maple for the tails. I removed the bulk of the waste with a coping saw, then drove the chisel with light mallet taps to clean up the remaining material in front of the baseline.

Next, I shaped a mortise-and-tenon joint in straight-grained white oak. First, I chopped and pared away the waste on the tenon. Then, after boring out the bulk of the mortise on a drill

SWISS MADE



Because of its shape, the hornbeam handle is particularly easy to grasp from the end. The blade was perfectly flat with nicely softened edges, making it easy on the hands. The cutting edge held up better than average. The fine craftsmanship and high performance make this a very close runner-up for best overall among the Western chisels.

TWO CHERRIES



This chisel has a hornbeam handle with a hoop ferrule, and its well-polished blade was easy on the hands. It didn't take much effort to put the tool into service, and its feel, balance, and performance made it easy to like. The side bevels are sufficient for dovetail work and the cutting edge held up about average.

IYOROI

BLUE STEEL



The hoop on the boxwood handle requires setting prior to use. The blade is laminated from iron and hard-wearing blue steel, which is an alloyed, high-carbon steel that contains tungsten and chromium, making it particularly good for hard and abrasive woods. The fully beveled blade made it easy to reach into corners, but the ridge was uncomfortable when holding the chisel by the blade.

MATSUMURA

WHITE STEEL



Like its blue-steel counterpart, this tool was in perfect order right out of the box. White steel is a pure, high-carbon steel without alloys. Though it is reputed to take a keener edge than alloy steels, it didn't seem sharper than blue-steel chisels. And the edge didn't hold up as well as them, becoming jagged on harsh white-oak end grain.

NOMIKATSU



Unique among the Japanese-style chisels, this blade is not a two-part lamination, but rather 100% high-speed steel. Traditionally, HSS is extremely tough and long wearing, but too coarse to take a really keen edge. This new steel, developed by Hitachi, is not only tough, but it also can be sharpened to a keen edge. It survived the test among the elite. This is an excellent chisel.

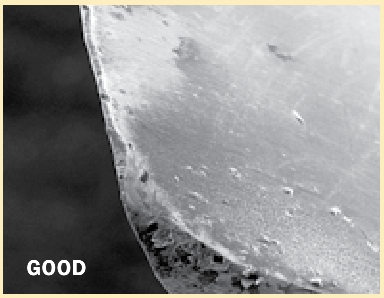
How the chisels rated

EDGE DAMAGE UNDER THE MICROSCOPE

To get a closer look at how the chisels fared after the edge-retention test, we shipped three of them to the Department of Materials Science and Engineering at Case Western Reserve University in Cleveland, Ohio. Under the direction of Professor David Matthiesen, they were placed in a scanning electron microscope at 100X resolution.

The best overall Japanese-style chisel, the Matsumura blue steel, stayed very sharp with minimal wear visible (top photo), indicative of very hard steel. The best overall Western-style chisel was the Lie-Nielsen. Its A2 steel blade didn't hold up as well as the Matsumura, and the wear (center) was representative of the average for Western-style chisels. The worst performer was the Grizzly Western-style chisel, whose edge completely rolled over (bottom).







press, I used each chisel with a mallet to finish the job. Finally, I used the chisel to fit the tenon to the mortise.

How long does the edge hold up?

The final test was for edge retention, the aspect woodworkers care about most. In order to create a level playing field, I re-honed all the chisels with a 30° bevel. This went against the advice of some manufacturers of A2 steel and Japanese chisels, but a 30° bevel is a better angle for most chisel work and I was curious to see if these blades would still be durable at the lower angle. I then trimmed 1⁄32 in. from the end of three 10-in.-wide boards: soft pine, medium-density cherry, and finally, hard white oak.

After using each chisel, I inspected the chisel edge, both visually and by feeling it, for degradation, and I documented the results. This revealed the quality of each chisel's steel; some edges were barely blemished, while others had collapsed under the strain. □

Chris Gochnour is a professional woodworker in Murray, Utah.

MODEL/SOURCE	ORIGIN
WESTERN-STYLE CHISELS	
Ashley Iles www.thebestthings.com	England
Ashley Iles American www.toolsforworkingwood.com	England
Barr www.barrtools.com	USA
Blue Spruce www.thebestthings.com	USA
C.I. Fall www.traditionalwoodworker.com	Sweden
Crown www.woodcraft.com	England
Footprint www.woodcraft.com	England
GarrettWade cabinetmaker's chisels www.garrettwade.com	Czech Republic
Grizzly deluxe bevel edge www.grizzly.com	China
Hirsch www.highlandwoodworking.com	Germany
Irwin www.amazon.com	China
Lee Valley www.leevalley.com	Japan
AUTHOR'S BEST OVERALL CHOICE **Lie-Nielsen** www.lie-nielsen.com	USA
MHG www.hartvilletool.com	Germany
AUTHOR'S BEST VALUE CHOICE **Narex** www.highlandwoodworking.com	Czech Republic
Sorby www.woodcraft.com	England
Pfeil Swiss Made www.woodcraft.com	Switzerland
Two Cherries www.toolsforworkingwood.com	Germany
JAPANESE-STYLE CHISELS	
Iyoroi blue www.toolsforworkingwood.com	Japan
AUTHOR'S BEST VALUE CHOICE **Grizzly Japanese chisels** www.grizzly.com	Japan
Matsumura white www.thejapanwoodworker.com	Japan
AUTHOR'S BEST OVERALL CHOICE **Matsumura blue** www.thejapanwoodworker.com	Japan
Nomikatsu premium grade www.traditionalwoodworker.com	Japan

Photos, this page: Case Western Reserve University

STREET PRICE	OVERALL LENGTH / BLADE LENGTH	SIDE FLAT (HEIGHT)	OUT OF BOX	ERGONOMICS	EDGE RETENTION	DOVETAIL	PARING	CHOPPING
$35	10⅝ in. / 3⅝ in.	.040 in.	Good	Good	Very good	Good	Very good	Very good
$26	7⅜ in. / 2½ in.	.025 in.	Good	Good	Very good	Excellent	Fair	Good
4 for $335	10⅜ in. / 3⅞ in.	.032 in.	Excellent	Good	Fair	Very good	Very good	Excellent
4 for $230	8 15/16 in. / 4⅜ in.	.010 in.	Excellent	Very good	Good	Excellent	Very good	Fair
$18	10¼ in. / 3¾ in.	.100 in.	Good	Fair	Good	Good	Good	Excellent
$20	10¾ in. / 4¼ in.	.080 in.	Very good	Good	Fair	Good	Very good	Good
$18	9 1/16 in. / 3¾ in.	.115 in.	Very good	Excellent	Very good	Fair	Very good	Very good
6 for $80	10 5/16 in. / 4 in.	.055 in.	Good	Good	Good	Very good	Very good	Excellent
8 for $44	10⅜ in. / 4¼ in.	.065 in.	Good	Good	Poor	Good	Good	Good
$25	10 5/16 in. / 4⅛ in.	.080 in.	Good	Good	Good	Good	Very good	Very good
$12	10 3/16 in. / 4 in.	.080 in.	Good	Good	Good	Good	Good	Very good
$12	9⅞ in. / 4 in.	.122 in.	Fair	Good	Very good	Fair	Good	Excellent
$50	9 in. / 3⅝ in.	.025 in.	Very good	Excellent	Good	Excellent	Very good	Very good
$16	10 3/16 in. / 4 in.	.088 in.	Very good	Very good	Good	Very good	Very good	Excellent
$6	10⅜ in. / 4¼ in.	.062 in.	Very good	Good	Good	Very good	Very good	Excellent
$41	10⅜ in. / 4 in.	.040 in.	Fair	Good	Fair	Very good	Very good	Excellent
$31	10⅜ in. / 4 in.	.080 in.	Excellent	Very good	Very good	Very good	Very good	Excellent
$22	10 5/16 in. / 4⅛ in.	.080 in.	Good	Very good	Good	Very good	Very good	Excellent
$51	8¾ in. / 2¼ in.	.092 in.	Fair	Good	Excellent	Excellent	Fair	Very good
$14	8 13/16 in. / 2¼ in.	.110 in.	Fair	Good	Very good	Very good	Fair	Very good
$42	8 7/16 in. / 2¼ in.	.080 in.	Very good	Very good	Good	Excellent	Fair	Very good
$51	8⅝ in. / 2½ in.	.075 in.	Very good	Very good	Excellent	Excellent	Fair	Very good
$45	8⅞ in. / 2¼ in.	.087 in.	Very good	Very good	Excellent	Excellent	Fair	Very good



Side Table With a Twist

Classic English table is a shape-shifter

BY CHRIS GOCHNOUR

Cricket tables were common in England during the 18th century. Typically distinguished by round tops and three-legged bases, many cricket tables, like the one featured here, also included drop leaves, adding an extra measure of charm and utility. Although this piece is based on an early English table, I made a few changes to give it a look that's distinctly American Arts and Crafts.

Make the diamond-shaped legs

Rip blanks for the legs out of two boards, each 1¾ in. thick by 3¼ in. wide by 28 in. long. Go to p. 46 to see the right sequence of tablesaw cuts. I found that using two boards simplifies the leg-making process even though it produces one more blank than needed. The extra blank comes in handy as a test piece. My sawblade tilts to the right, but the procedure is the same for a left-tilt saw as long as the fence is oriented correctly.

Now cut the legs to length—Because the legs splay out under the table, the crosscuts must be made at an angle. Begin by labeling, on a side surface, the top and bottom ends.

On both ends of each leg, draw a reference line from the 120° corner to the 60° corner. This line must always be horizontal when you trim the ends.

Now, set your miter-saw blade 7° to the left. Clamp a support cradle (see p. 47)



GIVE IT A SPIN

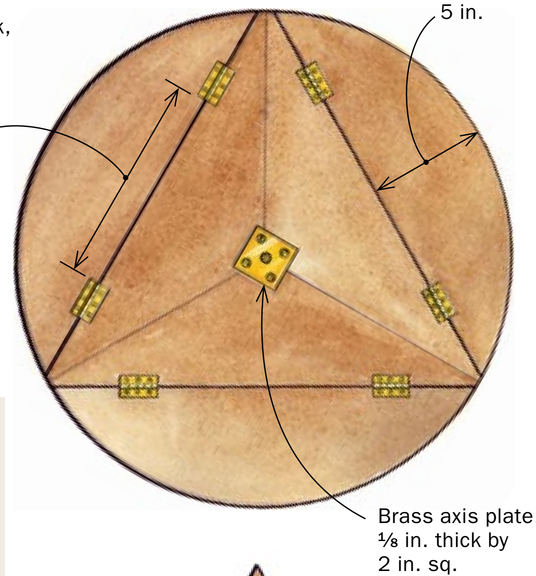
With the leaves lowered, the table has an eye-catching triangular top. To expand the top and change the look, raise all three leaves at once and rotate the top until the leaves are over the legs.

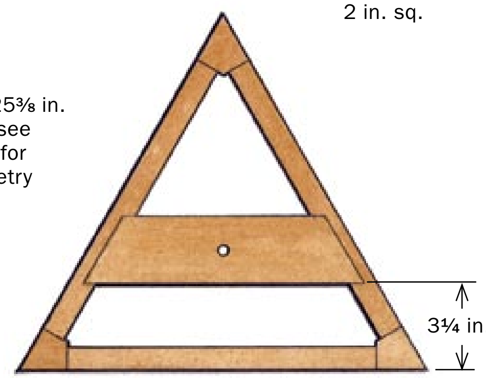


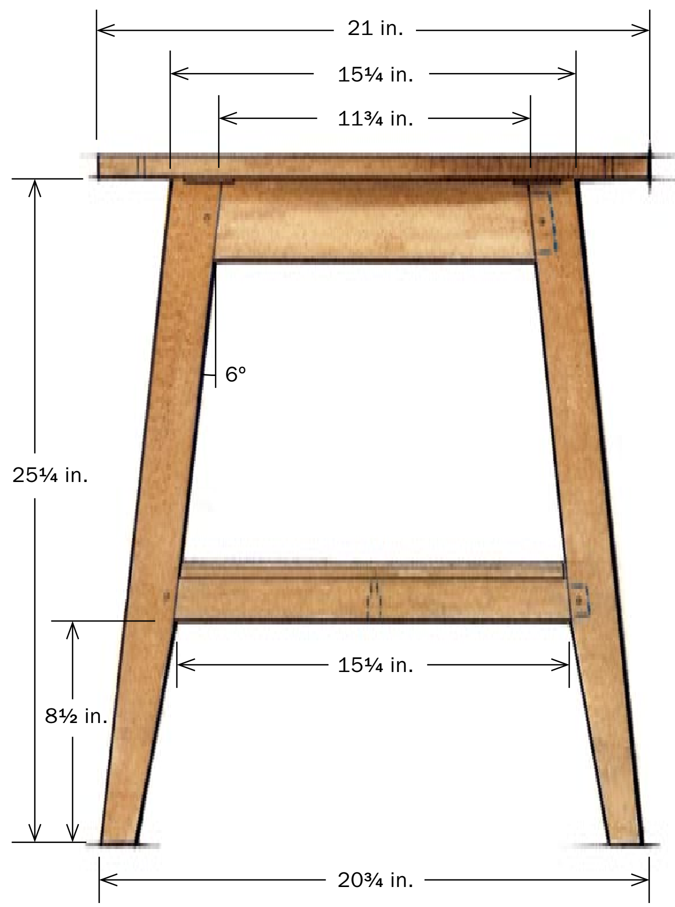
Photos, this page: Michael Pekovich; drawings: Bob La Pointe

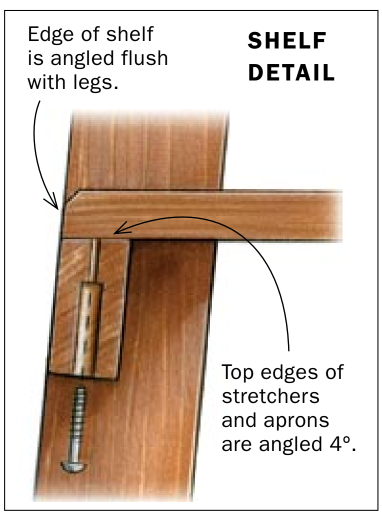


Note: Before the corners are trimmed, the top and shelf are equilateral triangles with 19-in. sides.









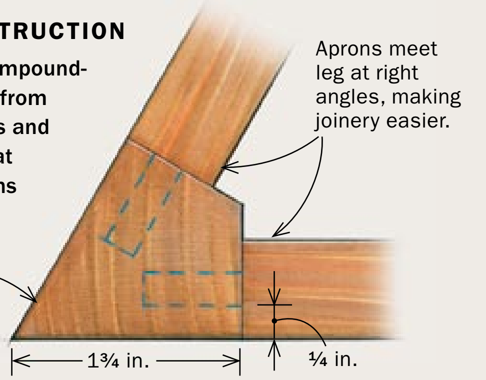
DROP-LEAF TABLE

Early cricket tables were made from a variety of woods, among them elm, oak, pine, sycamore, and walnut. Gochnour chose quartersawn white oak because it is in keeping with the Arts and Crafts style. Quartersawn white oak is also stable, so changes in humidity are less likely to warp the leaves or put stress on the spline joints that connect the three-piece triangular top.

Cut the leg blanks

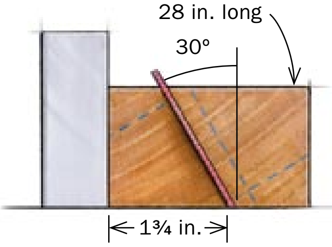
LEG GEOMETRY SIMPLIFIES CONSTRUCTION

Splayed legs usually require fussy-to-cut compound-angle joinery, but not on this table. Viewed from above with the table assembled, the aprons and stretchers meet the diamond-shaped legs at right angles. So, to splay the legs, the aprons and stretchers need only be angled in one direction.

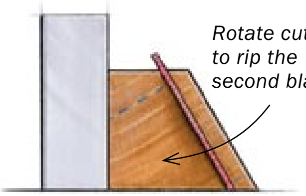


Rip the stick into two blanks. *Angle the blade and set the rip fence as shown. Cut the first blank, rotate the offcut piece, and cut the second blank. Rip the other stick to get four blanks total. For all cuts, use a push stick near the blade.*

FIRST CUT



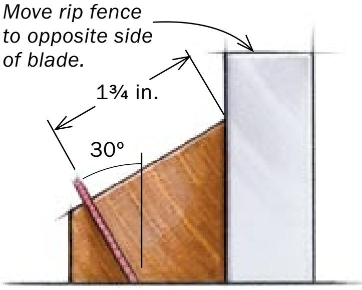
SECOND CUT





A final cut completes the shape. *Move the rip fence to the other side of the blade. Use the spare blank to make test cuts until the top face is 1¾ in. Rip the remaining three blanks at the same setting.*

THIRD CUT





slightly to the left of the blade, and place the leg in cradle A with the top end at the blade and the reference line horizontal. Now, while holding the leg in place on the jig, trim the top end at 7°. Do the same for the top ends of the other two legs.

Next, shift the cradle to the right side of the blade. Mark the leg's total length at 25⅜ in. and cut the bottom end of each leg parallel to the top end.

Cut the angled mortises—Each leg has four mortises—two for the aprons and two for the stretchers—all cut on the narrow sides of the legs and inset ¼ in. from the wide side of the leg. With a dozen to cut, I put my hollow-chisel mortiser to work, along with the leg jig. After the machine work, I used a chisel to shave the ends of the mortises to 6°. Taper the legs as shown (bottom photo, facing page).

Tenon the aprons and stretchers

You are ready to make the three aprons and three stretchers. Rip the parts to width, then use the tablesaw miter gauge set at 6° to crosscut them to length.

Cut the outside cheeks—The tenons are next, starting with the aprons. Decide which side of the parts you want on the outside of the table.

Set up the tablesaw with a ⅝-in.-wide dado blade raised slightly less than ¼ in. above the table. Position the rip fence ¾ in. from the outside of the blade. Use a miter gauge, angled away from the blade at 6°, to reference the end of the apron so it's parallel to the fence.

Then, with the outside face of the apron against the saw table and the end butting against the rip fence, cut one of the outside tenon cheeks. You'll need two overlapping passes to remove all the waste. Because the outside faces of the aprons, stretchers, and legs are flush to each other, the tenon location is important (see p. 48 for a tip). Repeat on all the parts, making the cuts only on the same outside cheeks.

Now, readjust the miter gauge to angle toward the blade at 6°. Make the outside cheek cut on the other end of each part. After the last cut, you'll have all the outside tenon cheeks cut to align flush with the outsides of the legs.

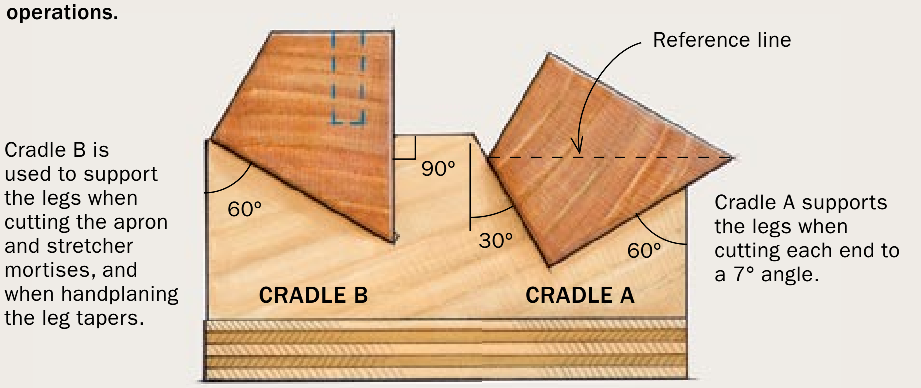
Cut the inside cheeks—At this point, it's just a matter of cutting the inside cheeks to fit snugly in the mortises. That's done by making several cuts to "sneak up" on a perfect fit. Start by placing the inside

Photos, except where noted: Tom Begnal

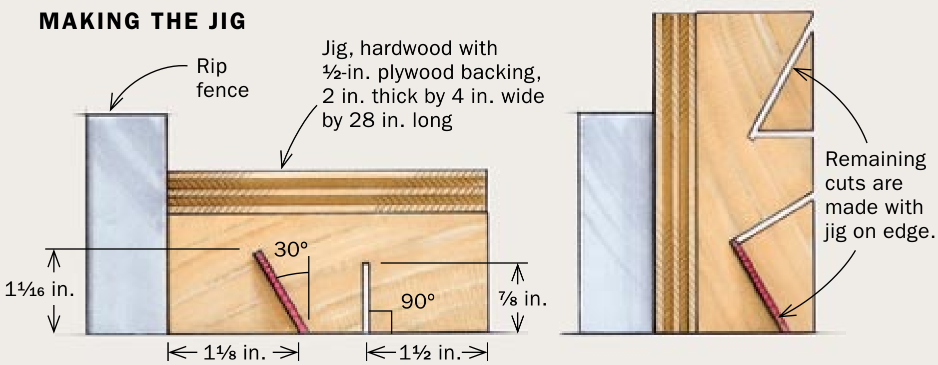
A cradle makes joinery easier

A JIG HOLDS THE LEG IN TWO POSITIONS

The odd shape of the legs makes them difficult to clamp in place for cutting to length, cutting mortises, or planing the tapered bottoms. This support jig simplifies all three operations.



MAKING THE JIG



The blade is at 90° for the first cut, 30° for the remaining three. You end up with two channels, each cut at different angles and used for different purposes as the legs are made.



Trim to length. *With the jig clamped to the left side of a miter saw set to 7°, trim one end of each leg. Then slide the leg to the right side of the saw and cut to length at the same 7°.*



Cut mortises. *Gochnour uses a mortiser to remove most of the waste. Then he angles the ends of the mortises to 6° with a bench chisel.*



Taper the legs. *After using a bandsaw to remove most of the waste, use the cradle jig to hold the legs in place so a handplane can clean up the surfaces.*

face of an apron against the saw table and butting the end against the rip fence. Also, butt the edge of the apron against the miter gauge, which is still facing toward the blade at 6°. Then, make a shallow (about ³⁄₁₆ in.) cut. As before, you'll need to make two passes.

Check the tenon fit; you can expect the tenon to be too big because the dado-blade cut was shallow. Raise the dado blade slightly, then recut and recheck the fit. Continue increasing the depth of cut until the tenon fits just right. Now, make inside cheek cuts on all the aprons and stretchers with the miter gauge angled toward the blade.

Readjust the miter gauge to angle away from the blade at 6°. Then make the inside cheek cut on the other end of each part. After the last cut, you'll have all the cheek cuts done.

Last, lay out and mark the location of the top and bottom cheeks and shoulders. Cut to the lines with a backsaw.

Bevel the aprons and stretchers—The upper edges on all the aprons and stretchers must be beveled so they end up parallel with the tabletop and bottom shelf. Cut the bevels on the tablesaw with the blade tilted to 4°.

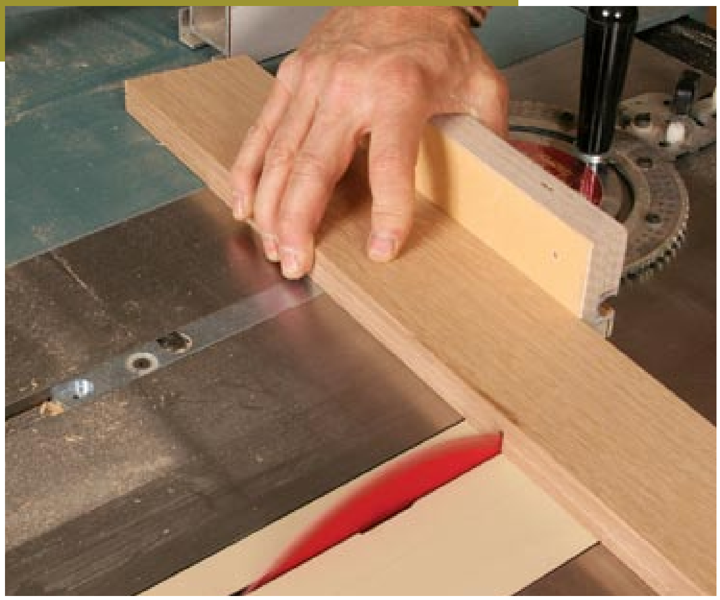
Now you can go ahead and smooth all of the surfaces with a handplane to remove any mill marks.

Band clamps ease assembly

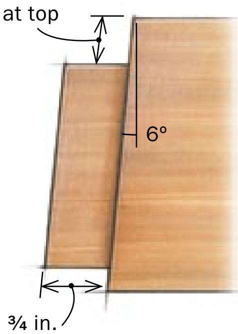
Assemble the legs, aprons, and stretchers. The joints are angled and the base is triangular, but band clamps work wonderfully. You'll need just one for the aprons and one for the stretchers.

The glue-up is a five-minute operation. Use a small brush to apply glue to all the

Aprons have angled tenons



Cut to length. *Cut the aprons (shown) and stretchers to length with the tablesaw miter gauge at a 6° angle.*





TIP



Check the shoulder depth. *When the outside cheek is butted against a leg, the tenon shoulder should be flush with the outside face of the mortise.*

Outside cheeks are first. *With a dado blade in the tablesaw, the miter gauge facing 6° away from the fence, and the rip fence positioned to establish the tenon length, cut all the outside cheeks on the left end of each apron and stretcher (above). Then, reset the miter gauge to face 6° toward the fence and cut all the outside cheeks on the right end of each apron and stretcher. Then flip the workpieces and cut the inside faces (right).*





Cut the top and bottom. *With a tenon saw, make a pair of parallel cuts to establish the top and bottom of the tenon. Then cut across the grain (above) to form the shoulders.*

mortises and tenons. Assemble each one, and then add the band clamps.

Install the axis board—The axis board runs parallel with one apron and is notched into the other two. A slightly oversize hole through the center of the axis board accepts a machine screw that secures the top to the base and serves as a pivot point.

Notch the base for the hinge barrels—When the top of the table is rotated 60° to open or close the leaves, the hinges pass over the top end of the legs and aprons. So, at each of the three corners of the base, you'll need to cut a ⅛-in.-deep notch to allow clearance for the hinge barrels.

Mark the notch locations with a trammel, then use a router to remove the waste between scribe marks. Finish with a chisel.

The top is fun

The top is an interesting geometric array made up of six boards. Three are isosceles triangles joined with splines to create a central equilateral triangle. The other three are circular segments, and attach (with hinges) to the central triangle to form the drop leaves and create a full circle. From the drawing on p. 50, make a full-size template of the triangle and the drop leaf.

Use the two templates to lay out the isosceles triangles and leaves in a row on a single board. Cut all six parts on the bandsaw, making sure all are slightly oversize. Then, use the tablesaw with a cutoff table and protractor fence to trim the two inside edges on each triangular piece so they're

Band clamps aid glue-up



Glue and clamp. *Add glue to all the mortises and tenons, then assemble the parts. A pair of band clamps—one around the aprons, one around the stretchers—provides all the pressure needed.*



Plane the outside surfaces perfectly flush. *With a piece of plywood clamped to the workbench to serve as a planing platform, Gochnour uses a smoothing plane to make sure the outside faces of the legs, aprons, and stretchers are perfectly flush.*



Add the axis board. *An axis board spans two of the stretchers to provide a centerpoint for mounting the top. Cut the board to size, then mark the location of the apron notches that accept the ends of the board. Cut the notches and glue in the board.*

straight and meet at exactly 120º. Later, after the sections are glued, handplane the three outer edges to exact size.

The splines keep the triangles aligned during assembly and add glue area, which means a stronger joint, important because wood movement will stress these areas. You can cut the stopped grooves on a router table with a ¼-in. slot-cutter buried in the router fence. Elevate the slot-cutter so the cut will be centered on the ¾-in.-thick stock. Then, set the fence to make a ⅜-in.-deep cut.

Note that each triangular piece has one long edge, and two shorter edges of identical length. Each of the two shorter edges gets the stopped groove for the splines. On one of the edges, you begin the groove at the stopped end by plunging the slot-cutter into the stock and then feeding the entire edge of the triangle through the cutter. When making the plunge cut, it's important to make sure the triangle corner nearest the plunge is kept firmly against the router fence to serve as a pivot point. Don't use the opposite corner as you'll likely run into some kickback as the stock is plunged.

To cut the remaining edge, place it against the fence, then feed the stock into the slot-cutter. Stop the cut just short of the triangle corner before using the opposite corner as a pivot point to swing the edge away from the cutter.

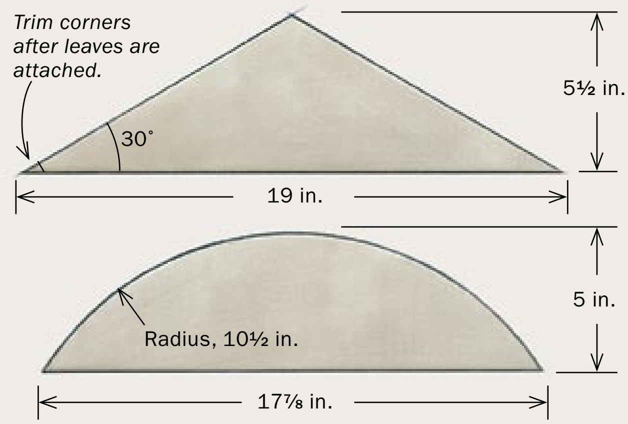
To clamp the three triangles, I make a clamping table out of melamine and hardwood braces (see p. 50). It uses a system of wedges to apply even clamp pressure to the triangles. When the glue has set, remove the excess glue with a scraper and handplane. If handplaning isn't your forte, you can simply sand the top and bottom surfaces smooth. Complete the triangular top by planing the outer edges to their final dimensions.

With the triangular portion completed, use a trammel set to a 10½-in. radius to make reference marks where the circular leaves will be attached. The points of the triangle will be trimmed later to align with the leaves.

The shelf is like the top—The triangular shelf is a thinner version of the one on top, but the construction is essentially the

Make the top and leaves

For consistent color and grain, cut the top pieces from a single 7-ft. board. Make a template of both shapes, and then arrange and trace them on the board.







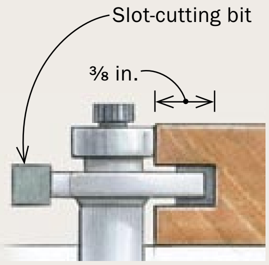
Rough-cut the parts. *Cut the circular parts (shown) and triangular parts with a bandsaw. Stay just outside the marked lines so the parts end up slightly oversize.*



Trim the triangles to exact size. *Gochnour uses a shopmade cutoff table with a protractor fence to trim the two inside edges of each triangular part. He handplanes the outside edges after assembly.*

SPLINES STRENGTHEN THE TOP AND SHELF

Cut the spline grooves. *Cut a stopped groove on the inside edges of the triangles. The grooves accept splines that restrain wood movement.*







Assemble the triangles. *A clamping table, made from melamine so glue won't stick, has three wood cleats screwed to it, two of them angled to accept wedges. Assemble the three triangular parts using glue and splines, then add the assembly to the clamping table and drive wedges between the cleats and the triangle.*



Add the leaves and attach the top



Set the hinges. *Lay out and scribe the location of the hinges on the leaves (left), then mortise them in. Then use a clamp to hold each leaf to the triangular top, and transfer the hinge locations (above).*

same. Make a full-size template of the isosceles triangle from the drawing on p. 50.

Mount the leaves and attach the top

Now you can attach the drop leaves. First, use a spokeshave to smooth the curved edge of each leaf to the line traced earlier.

The hinges are 7/8-in. by 1½-in. butt hinges from White Chapel Ltd. (www.whitechapel-ltd.com). To mount them, mortise the hinges into the leaves at a point 3 in. from each end. With the hinges installed on the leaves, align them with the triangular top and transfer the hinge locations. Then mortise the top and screw the hinges in place. Now use a bandsaw, file, and sander to shape the points of the tabletop to align with the drop-leaf curves.

The top is fastened to the base with a machine screw that slips through a slightly oversize hole in the axis board and into a threaded brass plate mortised into the underside of the top. Drill and tap for a 1/4-20 thread in the center of the plate. Then, bore and countersink for four 1/8-in.-dia. holes near the corners of the plate. Cut a mortise to accept the plate, and secure it with #6 by 1/2-in.-long brass wood screws. Now, attach the top and enjoy this unique side table. □

Online Extra

For the finish recipe used on this table, go to **FineWoodworking.com/extras.**

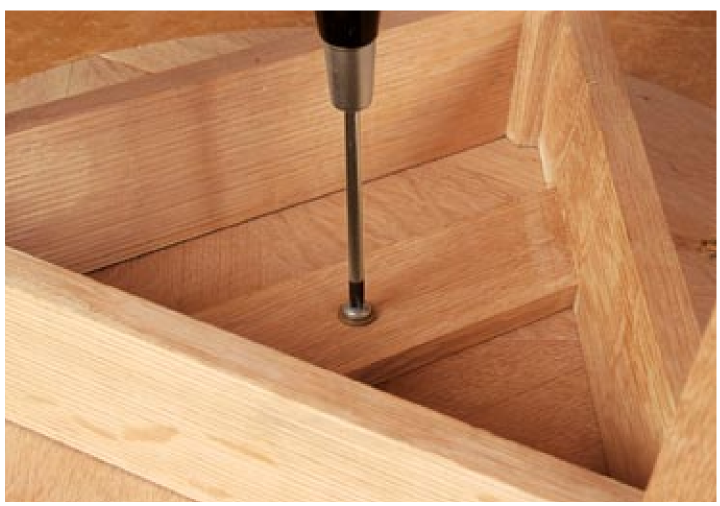
Chris Gochnour builds custom furniture in Murray, Utah.



Make the axis plate. *Use a hacksaw to cut a brass plate to size, then drill four mounting holes and a center hole. Tap the center hole for a 1/4-20 thread.*



Mount the plate. *After mortising in the axis plate, attach it with four brass wood screws.*



Mount the top. *To attach the top to the base, add a washer to a single round-head machine screw, then slip the screw through a slightly oversize hole in the axis board. Tighten the screw until it's slightly snug.*

Blotch-Free Cherry

We tried every known approach and emerged with the surefire winners

BY MARK SCHOFIELD



Cherry's popularity for fine furniture is no surprise: It is hard but not heavy; it cuts easily with power tools or by hand; the grain is restrained but interesting; and over time it takes on a beautiful, deep, red-brown color.

However, like a scorpion, there is a sting in the tail for the unwary. Many woodworkers apply an oil-based clear finish only to see the wood break out in random, dark, ugly blotches. Those who stain the wood, intending to instantly turn pallid, freshly cut cherry into the rich look of a 200-year-old antique, can see even worse results.

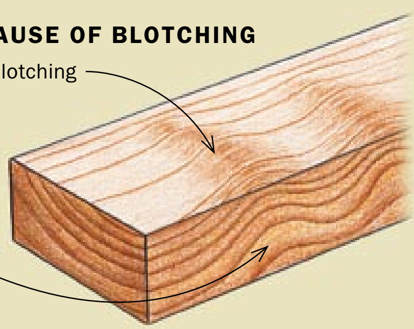
Not all cherry behaves like this. I'll show you how to spot the problem areas in advance. I'll also give you tips on how to pretreat your project before you apply a stain or a clear coat. When you start with a wood as nice as cherry, it's worth learning how to finish it.

Everyone agrees blotching is caused by uneven absorption of a liquid, whether it is a dye or a clear finish. There is less agreement on the causes. Some say it is resin deposits from

Alcohol reveals trouble spots

It is very difficult to spot blotch-prone areas on bare boards, especially after sanding. The best way to find them is to wipe the wood with denatured alcohol. This will leave blotch-prone areas that are darker than their surroundings and take longer to dry.

FIGURE IS ONE CAUSE OF BLOTCHING



Where curly grain rises to the surface, it exposes end grain. This absorbs more liquid, whether stain or clear finish, than the surrounding wood and causes blotching.



***Danger ahead.** Wiping the wood with denatured alcohol reveals darker, blotch-prone areas.*

Photos: Mark Schofield; drawings: John Tetreault



TESTING, TESTING...

There are numerous recipes and products that claim to prevent blotching. To discover which worked, which were worth the time, effort, and money, and which were best ignored, Schofield prepared three sample boards of very blotch-prone cherry. He tested the different methods under a clear finish, various oil-based pigment stains, and a water-based dye. He then retested the winning formulas on larger samples, to see how they performed in various grain situations.

kiln drying, while others point to alternating grain, similar to that found in curly wood.

No matter the cause, to locate these blotch-prone areas and to anticipate the degree of blotching, wipe all of the wood with a cloth soaked in denatured alcohol. Most of the wood should stay a uniform shade, but certain parts may soak up the alcohol, turning the wood much darker. These areas, which also will take longer to dry, are the ones that will blotch when a dye or oil-based finish is applied.

Now that you know trouble lies ahead, forewarned is forearmed. You can use a variety of different products and techniques, depending on the severity of the blotching, to pretreat the wood before applying a dye, stain, or clear finish. However, even if there are only one or two problem areas, the whole workpiece will need to be treated in order to achieve an even appearance when finished.

Online Extra

To watch the author apply a high-gloss finish to curly cherry, go to **FineWoodworking.com/extras.**

Many methods of blotch control; not all work

The objective of all blotch prevention is to even out the absorption capacity of the wood, and there are at least a dozen products and techniques that claim to achieve this. The majority aim to restrict the wood's ability to absorb a dye or clear finish by burnishing or semi-sealing the surface. The second method is to saturate the wood with another liquid prior to applying the finish.

To discover which methods worked best and how much time and effort they took, I initially made three sample boards of blotchy cherry. I sanded half of each board to P150-grit, while the other half was treated with six



3 ways to reduce blotching from clear finishes

Oil-based finishes are the most likely of the clear finishes to cause blotching on cherry. These include wiping varnish, oil/varnish mixes, Danish oil, and polyurethane, and the blotching can occur whether the finish is wiped, brushed, or sprayed on. The sample board shows how Watco Danish Oil is affected by various treatments.

1. FOR MINIMAL BLOTCHING, KEEP ON SANDING



If the alcohol test reveals that only minimal blotching is likely, the simplest method of blotch control is to sand to a higher final grit. Instead of stopping at P150- or P180-grit sandpaper, carry on through the grades until you reach P400 grit. This smooths and burnishes the wood, making it less able to absorb a liquid. It will still allow the deep, lustrous look associated with oil-based finishes, but it does involve more time sanding—a task that few of us find appealing.

2. A WATER-BASED CONDITIONER SEALS IN MODERATE BLOTCHING



Minwax's Water-Based Pre-Stain wood conditioner feels and looks like a greatly thinned water-based clear finish, and dries to a thin film on the surface. Brush on a single coat, let it dry thoroughly, and then sand it with P320-grit paper. Remove the dust and apply the oil-based clear coat of your choice. This method works well on wood with moderate blotching, yet the results still resemble a penetrating finish. Don't be tempted to thin a water-based finish by 50% and use that as a blotch controller; it won't work.

3. NOTHING BEATS SHELLAC ON SEVERELY BLOTCHY WOOD



If the alcohol test reveals severe blotching is likely, stop sanding at P180-grit and apply a single coat of a film finish that has been heavily thinned. Known as a washcoat, the most common choice is a 1-lb. cut of dewaxed shellac. The blotch-prone areas will soak up the washcoat more than the rest of the wood. After the washcoat dries, sand it lightly with P320-grit sandpaper. You'll remove much of the sealer but leave the blotch-prone areas lined with it, allowing the surface to absorb clear finish more evenly. This will almost eliminate blotching, but the reduced oil penetration will also leave more of a film-finish look.

methods of blotch control. One board was finished with Danish oil, another wiped with a water-based dye, and the last was wiped with an oil-based pigment stain. After discussing the results with the other editors, I did further testing using larger areas, to explore various grain situations and types of stains.

Some clear finishes cause blotching

We've all sighed with content as that first coat of Danish oil reveals the true color and shimmering depth of cherry. This is what woodworking's all about, we think, and happily press on. The next morning is when the shock hits: What is that dark area on that drawer front? Why doesn't it disappear when you look at it from a different angle? It's not poor sanding, because the surface feels uniformly smooth. Welcome to the world of blotchy cherry.

It's not just oil/varnish blends like Danish oil that cause blotching, but also wiping varnishes such as Waterlox Original, and oil-based alkyd varnishes or polyurethanes. Any blotching will be less noticeable than when dyeing or staining, but the darker



How blotch prevention works. *The near side of the board was washcoated with shellac while the far side was left bare. Then the surface was flooded with Danish oil. After 30 minutes (above), the bare wood had absorbed almost all the finish, while the washcoated side had absorbed far less.*

Two blotch-control methods to avoid

GLUE SIZE: EFFECTIVE BUT TIME-CONSUMING



You've probably noticed how remnants of glue squeeze-out leave annoying pale areas after you've applied a dye or an oil-based clear finish. You can exploit this by diluting some yellow glue with about eight parts of water to create a glue size. Brush on a single coat, let it dry, and then sand the surface with P320-grit paper. Like a washcoat of shellac, this seals the blotch-prone areas so they will end up the same color as the rest of the board. However, the water-based glue size raises the grain more than shellac, takes longer to sand smooth, and can't be used under a water-based dye or water-based clear coat. So stick with shellac.

SOLVENT-BASED CONDITIONER LEFT SPLOTCHES



Just as an inoculation gives your body a small amount of the disease, in theory you can treat blotching by first applying a much-diluted coat of a penetrating finish. The directions call for flooding the surface and then wiping off the surplus. Then you apply the dye or clear coat. I found pre-saturation less effective than sealing the wood, especially on heavily blotchy cherry. I applied a coat of Minwax's Pre-Stain wood conditioner (not to be confused with the water-based product of the same name, which actually seals the surface), but it left orange splotches on the wood that showed through the clear finish.

3 ways to add color to cherry without blotching

To narrow down the options, Schofield first tested a number of dyes and stains on separate sample boards, each treated with various stain controllers. Then he made the board at left to illustrate how the best stain controller—a washcoat of shellac—can help with three good methods of coloring cherry.



TINTED OIL ADDS MINIMAL COLOR WITHOUT FUSS





Penetrating pigment. *Tinted oil was liberally applied (above) and then wiped off (right). The wash-coated side didn't blotch; the bare-wood side did.*

Watco's cherry Danish oil is a pigmented stain, and as expected caused severe blotching on bare cherry. However, on blotch-prone cherry washcoated with shellac, the result was a light but even application of color. If you want only a slight change in your cherry's tone (remember, cherry will darken as it ages, even under a dye) and prefer the look of a penetrating finish, this is the way to go.

GEL STAINS ADD EXTRA COLOR WITH EACH COAT



While Bartley's Pennsylvania cherry left bare wood blotchy, it left wood washcoated with shellac evenly colored and blotch-free, but with the grain slightly highlighted. Each coat of gel stain adds incremental color with minimal fuss, so if you are looking for an easy way to harmonize different-colored boards, try a gel stain. However, because gel stains are mostly pigment-based, each extra coat after the second or third will gradually make the finish more opaque, hiding the wood's figure.

WATER-BASED DYES OFFER CLARITY AND COLOR CHOICE



With dyes, the particles of color are far smaller than in pigment stains, so they remain suspended in the liquid (there's no need to stir the container) and they don't collect in the wood pores, highlighting them. However, they will still create darker areas on blotch-prone wood, so pretreating is advisable. A washcoat of shellac will reduce the overall impact of the dye when compared to bare wood, but you can get around this by mixing a more concentrated batch.

patches still will be blemishes. The three most effective ways to control blotching are described on p. 54, while two techniques to avoid are on p. 55.

Add color to cherry, but not bare wood

While many woodworkers recoil from the concept of coloring wood, with cherry in particular it's tempting to fast-forward the aging process and achieve an antique look in hours. Alternatively, you may be trying to blend cherry boards with different tones or to match an existing piece of furniture.

As well as the sample boards tested with water-based dye and oil-based pigment stain, I also tried a gel stain and colored Danish oil. Without exception, all of the coloring methods looked better when applied to cherry that had been pretreated with a washcoat of shellac. On bare wood, all of the dyes and pigment stains caused blotching to a greater or lesser extent.

On the facing page, I give three ways to color cherry based on the amount of color you want to add, the ease of application, and the number of colors available. Below I give a couple of coloring options to avoid.

The bottom line? Never apply any pigment stain or dye to blotch-prone cherry that has not been treated with a washcoat. Whatever dye or clear finish you use, try it on a sample board from scraps of wood left over from your project. Discover the hidden surprises there and not on your cherry workpiece. □

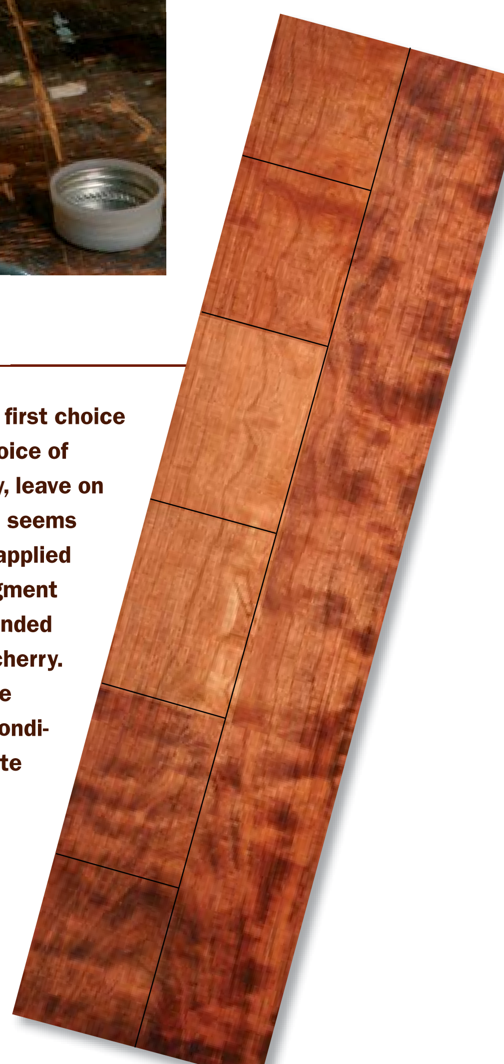
Mark Schofield is the managing editor.



Shellac prevents blotching. *A thin coat of shellac, known as a washcoat, is the most effective form of blotch control. However, it is important that you use dewaxed shellac, as waxy shellac can prevent some topcoats from adhering. Among the brands made by Zinsser, make sure you choose SealCoat, which is dewaxed, and dilute it 50% with denatured alcohol.*

Avoid oil-based pigment stains for cherry





Walk into any hardware store or home center and the first choice for coloring wood will be rows of wood stains. The choice of colors is extensive and the application method (apply, leave on for five minutes, and then wipe off with a clean cloth) seems simplicity itself. Just say no. On this sample board, I applied a single coat of Minwax Wood Finish, an oil-based pigment stain. On the right-hand side of the board that was sanded to P150-grit, it brought out the worst in this blotchy cherry. Various methods of blotch control on the left-hand side had mixed results. From top to bottom: An oil-based conditioner and a water-based one reduce but don't eliminate blotching; a coat of glue size or a washcoat of shellac eliminates blotching and most of the color but still leaves pigment in the grain; sanding to P400-grit and P220-grit makes little difference.



A Low Console for Home Theater

Versatile cabinet fits today's technology

BY STEVE CASEY

Just a few years ago, building an entertainment center for a large-screen TV meant designing a case piece big enough to hide an elephant. Today's slimmer sets can hang on a wall or sit attractively in the open, offering furniture makers new options. Among the most practical is a low console that can house media and electronics. It's a great way to bring that glorious high-definition picture out of the armoire.

I designed this console for a self-contained small home-theater system built around a 52-in. projection-style TV, but it would work

Photos, this page, facing page (top right and bottom left): Dean Della Ventura

Media-friendly features

A BACK THAT BREATHES

Multiple cutouts provide ample airflow for electronic components. The recessed back also creates space behind the piece for cords to drop freely.



TALL DRAWERS

Side-mounted slides allow deep storage for DVDs, CDs, and VCR tapes. Dividers keep everything organized.





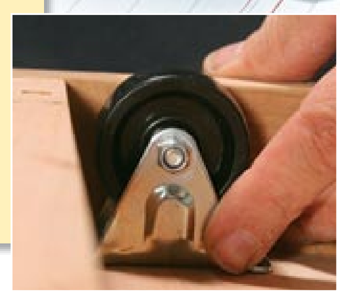
OPEN SHELVING

The components are accessible to hands and remote controls and become part of the design. The center shelving adjusts to fit a wide variety of components.



WHEELS

Six casters make it easy to reach the back for setup, maintenance, or cleaning. The wheels are inset to avoid a distracting gap between the floor and the bottom of the piece.



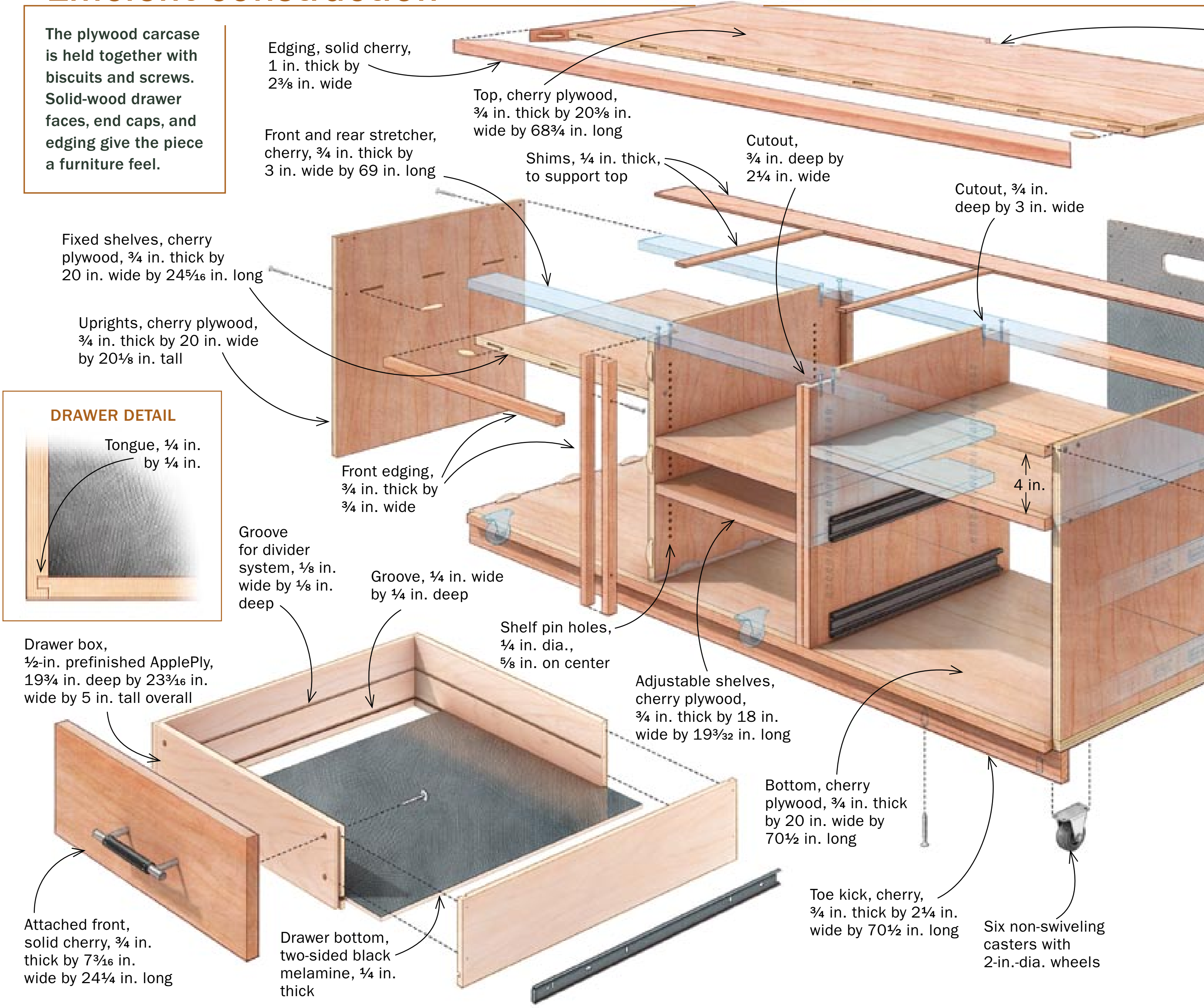
just as well with a slimmer flat-panel model. Visually, it's tasteful and tame enough to harmonize with quite a few furniture styles, and you can feel free to adapt its style to fit your room. Look below the surface, though, and it becomes clear this piece is media furniture through and through.

At 24 in. tall, the console is still low enough to place the center of most TVs at eye level for a seated viewer. And it's strong enough to support any set, so you won't need a tricky wall-mount.

At 22 in. deep, the cabinet will comfortably hold most electronic components. I designed the drawers specifically to house DVDs, VCR tapes, and CDs without making the case too tall. The back and shelves are engineered to promote ventilation for the equipment and to simplify cable management. And I put the whole piece on casters so it would be easy to pull away from the wall for system setup, maintenance, or cleaning. Small casters will work on a hardwood floor, but carpet calls for larger ones.

None of those features call attention to themselves. What you see and live with is a nice piece of furniture. The project is a good

Efficient construction



The plywood carcase is held together with biscuits and screws. Solid-wood drawer faces, end caps, and edging give the piece a furniture feel.

example of building a sturdy carcase in an efficient way, using sheet goods and techniques I developed and use for building large-scale entertainment center furniture and cabinetry.

Sheet goods make a stable case

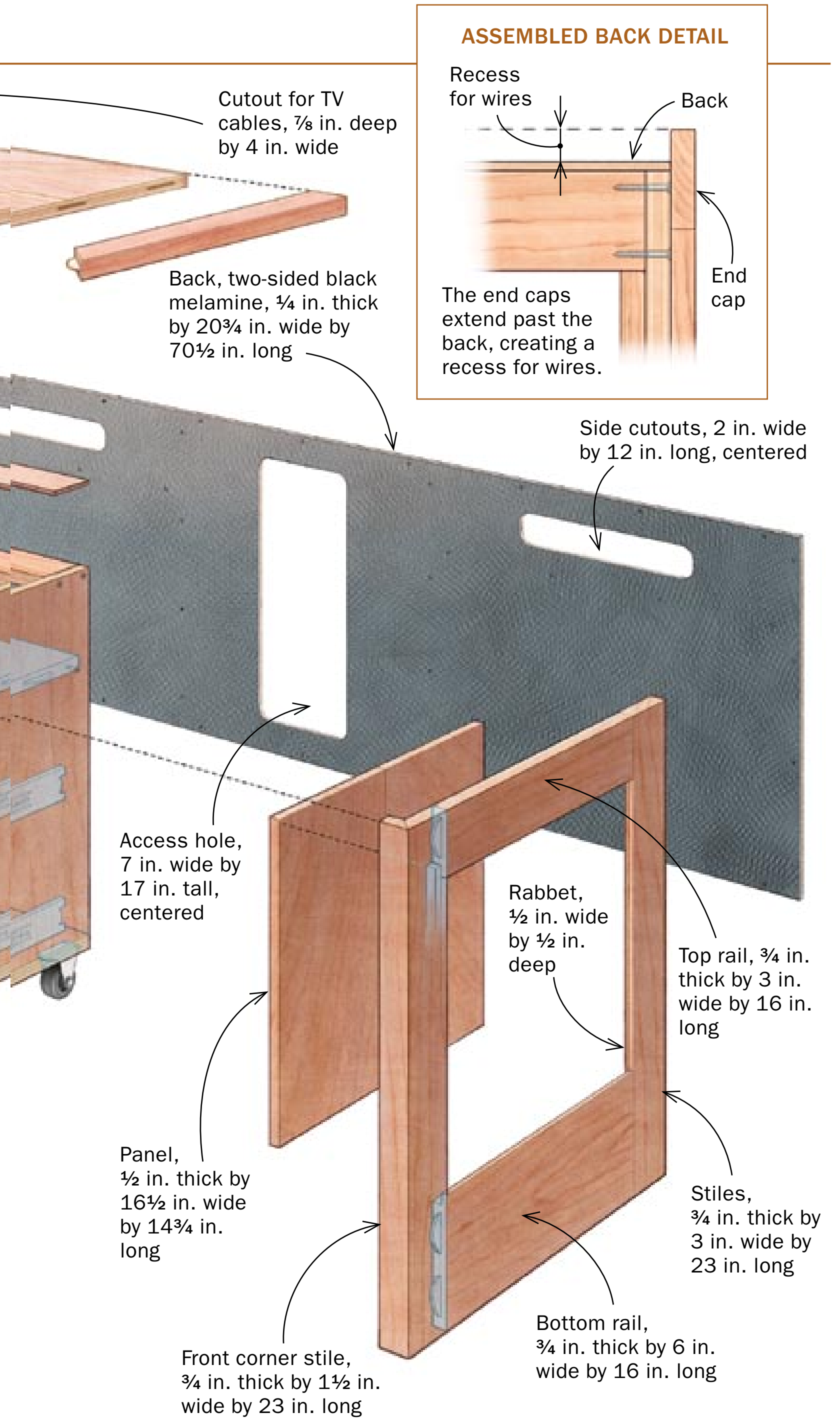
One of the greatest challenges in building furniture to house electronic equipment is that the gear generates heat that causes wood movement. So, I always use stable composite material (in this case, two sheets of cherry plywood) for media furniture carcases.

The first step is to lay out and cut the carcase parts. When cutting sheet goods, never assume that the original edges are straight or square. If you want a 20-in.-wide finished piece, cut it at least ⅛ in. larger, then turn it around and cut off the factory edge. If things are not square, it is usually best to square the ends of smaller ripped parts rather than the whole sheet. After all the parts are cut, I drill holes for adjustable shelves in the equipment rack space. Then I join the carcase together.

The carcase is joined entirely with biscuits and screws—no dadoes, no rabbets, no glue. I don't want to chip out the veneer on a $100 sheet of plywood while cutting dado and rabbet joinery, or fret over squeeze-out marring my finish in the corners. A glueless carcase also lets me disassemble the piece as needed during construction to check fit and measurements, making it much easier to fix mistakes.

There's no harm, of course, in using glue if you want to. But, after years of gluing everything to last an eternity, I've discovered

Photos, except where noted: Steve Scott; drawings: John Hartman



that biscuits and screws are more than strong enough to hold a piece like this together ... forever.

I predrill for the screws using a tapered bit with an integral countersink. I use #7, 1⅝-in. bugle-head construction screws with sharp, coarse threads and put them in carefully so they don't strip. It's easy to get splitting near the outside joint edges, so I put a clamp on the thread side of the joint so the wedge action of the screw doesn't split the panel.

Attach the solid trim

Solid-wood edging and other details elevate the console's appearance from cabinetry to furniture. The most prominent of these features are the frame-and-panel caps on the ends. The front stiles





The fixed shelves are first. *Construction begins with two H-shaped subassemblies (above). These assemblies are then connected by a plywood bottom (left). The space between them creates the central shelving area.*



Solid-wood stretchers connect the piece at the top. *These also create a place to attach the back and top of the cabinet. The front stretcher protrudes ¾ in. from the case, to meet the other edging, so Casey uses a piece of ¾-in. scrap to set the reveal.*

Make the side panels



The panel sits in a rabbet. *Rout the rabbet with a bearing-guided bit and square up the corners with a chisel.*

A no-clamp glue-up





Blue tape tames this miter. *Bevel the front stile after glue-up (upper right). Cutting it beforehand would deprive you of a square clamping surface. The mating piece is cut from the same stock. Strips of painter's tape align the edges and create a hinge for the glue-up (lower right). Casey wraps the assembly with several bands of painter's tape to secure the pieces (below). No biscuits or clamps are needed.*

are cut from the same stock as the side panels and are mitered to wrap the grain continuously from the sides to the face. The frames are assembled with biscuits, and the inside of each frame is rabbeted to accept a floating panel of ½-in. solid cherry or cherry plywood. This creates a ¼-in. reveal for the panel while maintaining consistent thickness for the exterior trim. The assembly is attached with screws driven into the frame from inside the case.

A solid-cherry stretcher across the top of the case combines with solid edging to dress out the rest of the case front. Before attaching the edging, I hand-sand a small 1/16-in. roundover radius on the inside corners of each adjoining piece of plywood and solid stock, including the pieces on the top. This creates a very fine parting line where the plywood and edging meet, accentuating what many folks would try to hide and, in the process, making an eye-pleasing detail. After the edging is attached, I rout a 3/16-in. roundover onto all the outside and inside corners.

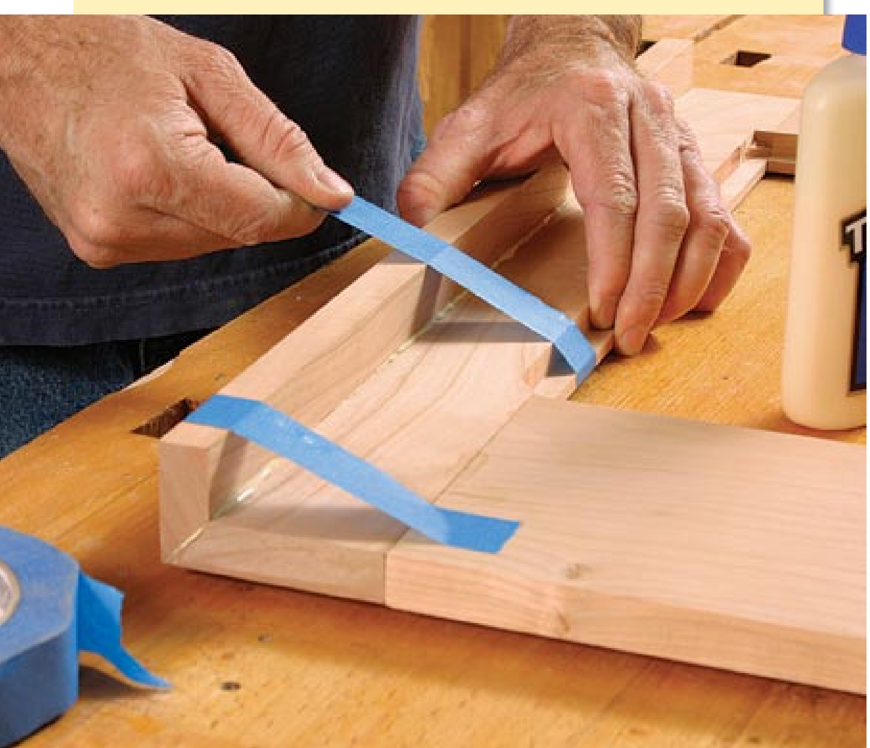
The drawers have simple joinery and false fronts

I build the drawers from ½-in.-thick prefinished ApplePly or Europly. The bottoms are two-sided, ¼-in. black melamine, in keeping with the high-tech contents. The joints are rabbeted, glued, and pinned with brads to hold them together while the glue dries.

I hang the drawers on black, side-mounted, full-extension slides. Undermount slides might yield a cleaner look, but they steal depth from the drawer at the bottom. In a console with limited overall height, this can make the difference between a drawer that can be used for media storage and one that isn't deep enough. I size the drawer boxes to accommodate a ¾-in.-thick separate front, with the faces recessed very slightly behind the front radius detail. Separate drawer fronts allow for perfect alignment after the piece is finally placed and loaded with equipment.

Edge the top and attach it

The top is plywood with a 1-in. by 2½-in. solid border, which is biscuited and mitered. This three-sided border creates a nice effect, making the piece appear to belong up against a wall. The raw edge on the back of the top is dressed with ¼-in. solid stock.





The mitered return hides the plywood. *The face grain wraps around to the front of the case and gives the look of thick, solid stock. The assembly is attached to the case with screws driven from inside. The panel is prefinished to prevent wood movement from exposing any unfinished areas at the edges.*

Fit the drawers



No measuring, no marking. *The lower slides sit right on the case bottom. To ensure proper spacing between the slides, Casey rips a piece of ½-in. MDF to match the drawer-face height.*



Use the spacer to locate the upper slides. *With the spacer positioned on top of the lower slide, its top edge supports the upper slide at the correct height for installation.*

To make room for the cables that connect the TV to the other equipment, make a small cutout in the back of the top. This also lets some heat escape when the case is tight against the wall. The top is held in place with screws driven from the underside through the solid cross-members of the case. Because the solid border is thicker than the top, you'll need to shim and fill the space between the plywood and the cabinet.

The back is two-sided, ¼-in. black melamine. Although thin, this material creates a rigid back that lends the piece much of its structural strength, so be sure to size the back to fit snugly between the rear stiles of the end caps. I fasten the back with screws countersunk and driven every 8 in. into the rear edges of the plywood carcase.

SOURCES OF SUPPLY

DRAWER PULLS
Atlas Homewares Zanzibar pulls
www.myknobs.com

DIVIDERS
Drawer divider supports
www.outwatercatalogs.com

DRAWER SLIDES
Accuride Series 3832
www.rockler.com

CASTERS
www.woodworker.com

DRAWER-FRONT ADJUSTING SCREWS
www.eagleamerica.com

Get the popcorn ready

Before finishing, break down all removable components, then sand everything that wasn't sanded prior to assembly. I used clear oil to bring up the color before spraying on a standard lacquer finish: one coat of sanding sealer and two coats of 40-sheen lacquer, sanding with 320-grit paper between coats. For an alternative hand-applied topcoat, try dewaxed shellac or a traditional oil finish.

Install the equipment, roll the finished unit into place, and you're all done. Time to pop in a DVD or watch some drivel on TV! □

Steve Casey (www.stevecaseydesign.com) designs and builds cabinetry in Los Angeles County.



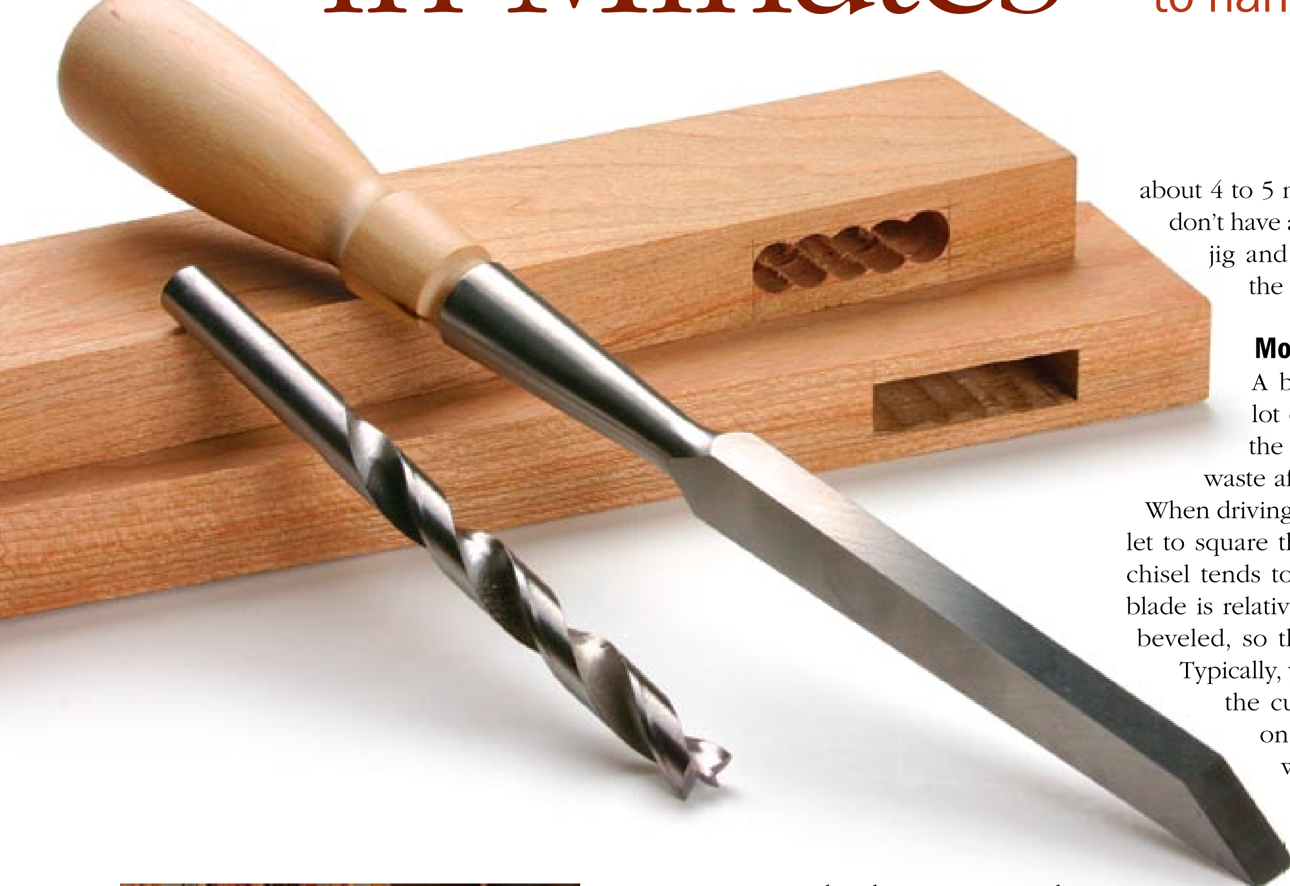
Attach the matching hardware. *Casey uses a combination square referenced off the bottom of the drawer side to pencil a layout line for the runner. Mounting screws are centered on this line and driven through factory-drilled holes in the hardware.*



False fronts and media storage. *Casey drills oversize holes and uses a 1-in. washerhead screw with a ½-in.-dia head (some manufacturers call them "drawer-front adjusting screws"). This creates wiggle room for slight adjustments in the position of the drawer front to get it square and even in the opening. The central horizontal groove houses the divider hardware.*

Cut a Mortise in Minutes

Drill out the waste, then use a unique chiseling technique to handle the rest





BY CHRISTIAN BECKSVOORT

Many woodworkers cut mortises by drilling away much of the waste with a drill press, then cleaning up what remains using a bench chisel. The technique is popular because it doesn't require a special machine or jig. It's a challenge, though, mainly because the chiseling process is slow and easily goes awry.

I've been building furniture full time for more than 30 years, and I still use drilling and chiseling to make many of my mortises. But I've managed to refine the process to just a few surefire steps.

The tools are simple. After removing most of the waste using the drill press, I use a mortising chisel to square an end and lever away—in one shot—most of the waste. A bench chisel quickly cleans up what's left.

This method delivers clean, accurate mortises, and quickly. Including the drill-press work, I can finish a 3⁄8-in.-thick by 1½-in.-wide by 1½-in.-deep mortise in about 4 to 5 minutes. By the way, if you don't have a drill press, use a doweling jig and handheld drill to remove the waste accurately.

Mortise chisel is the star

A bench chisel is ideal for a lot of applications, but it's not the best choice to clean up the waste after drilling a mortise.

When driving a bench chisel with a mallet to square the end of the mortise, the chisel tends to twist. That's because the blade is relatively thin and the edges are beveled, so there is little side support. Typically, you'll need to start and stop the cut several times to keep it on track. And chances are it won't be as clean a cut as you'd like.

It's also challenging to keep a bench chisel square when cleaning up the sides. So the mortise may not end up straight and smooth. Plus, compared to my method, it's slow.

The solution is a mortise chisel. They come in two basic types: One has a blade with a rectangular cross-section (parallel sides), and the other has a blade with a trapezoidal cross-section (tapered sides). You want the rectangular one. A rectangular mortising chisel won't twist easily as you bang it with a mallet to square the end of the mortise. And because the corners of the chisel meet at sharp right angles, you get a shearing cut when you lever it forward. That means much of the sidewall waste can be removed in one quick motion.

In addition, while bench chisels are normally sharpened to 25°, most mortising chisels are sharpened to 30°. That means the sharpened edge is less likely to fracture when levered.

Photos: Tom Begnal; drawings: Christopher Mills



Step 1 SCRIBE LINES SHOW THE WAY



Scribe the sides. *After marking the location with a pencil, use a marking gauge to scribe each side of the mortise, stopping at the pencil lines.*

Last, mortising chisels are thicker and longer than bench chisels. That adds stiffness and leverage, making them better suited to the forceful levering action.

It takes just four steps to cut any mortise. But first, make sure your chisels are sharp.

Keep in mind that this technique requires that the mortise and the mortising chisel are the same width. That means if you want a ⅜-in.-wide mortise, you need a ⅜-in.-wide mortising chisel. I find that three different chisel widths—¼ in., ⅜ in., and ½ in.—cover almost any mortise I need.

SOURCES OF SUPPLY

PARALLEL-SIDED MORTISE CHISELS

Lie-Nielsen Toolworks
www.lie-nielsen.com

Sorby
www.woodcraft.com

Layout is critical

Begin by carefully laying out and marking the length and width of the mortise. Use a sharp pencil to mark the ends. Then use a marking gauge to cut the two scribe lines for the sides. Now, with a square and a marking knife, cut scribe lines at the mortise ends. The cut lines are important: When you slip the sharpened edge of the chisel into them, they align it perfectly for the start of the cut.



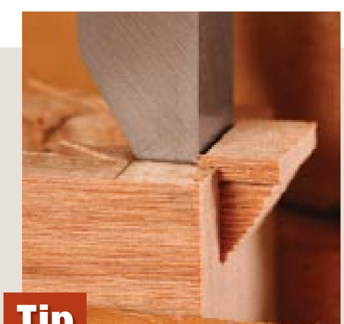
Scribe the ends. *To complete the layout, use a knife to scribe a cut line at each end of the mortise.*

Drill out the waste

Now you're ready to start removing waste wood to create the mortise. You could remove all the waste with the mortise chisel, but it's a lot faster to remove most of it by drilling a series of holes. Plus, drilling makes it easier to maintain a consistent depth along the length of the mortise.

I put the drill press to work here. Either a brad-point or Forstner bit works fine. Both of these bits let you drill overlapping holes to remove the maximum waste from the mortise. Just be sure that the bit diameter is the same as the mortise width, and position the fence carefully so that all the holes are bored dead-center into the mortise.

Start by drilling the first hole at one end of the mortise, and then do the same at the other end. After that, drill as many nonoverlapping holes as possible. Then cut



Tip

Keep the mortise at least ¾ in. away from the end of the workpiece. Otherwise the end-grain at the end of the mortise could blow out when you drive in the chisel.

Step 2 DRILL THE WASTE



SETUP



Drill press does the grunt work. *Use a bit that matches the mortise width. Clamp a fence to the table to ensure that the bit drills into the center of the piece.*

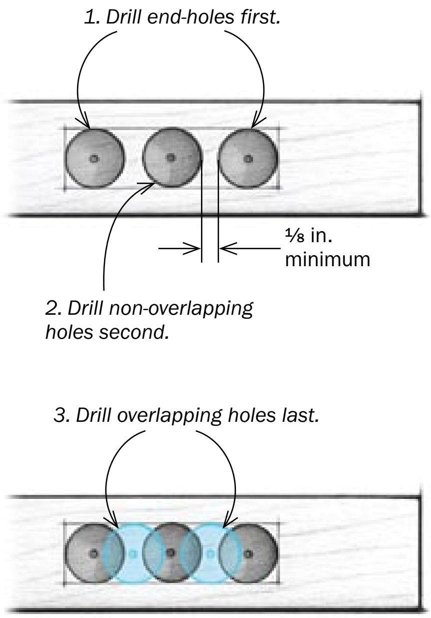


Dial it in. *After drilling a single hole in the test piece, use a dial caliper to make sure the hole is centered.*



DRILLING SEQUENCE

Drill the end holes and 'tweeners. *With the stock against the fence, drill a hole at each end of the mortise. In between, drill as many non-overlapping holes as possible (left), leaving ⅛ in. between holes. Then drill overlapping holes, anchoring the center spur in the material between each hole to help keep the bit from drifting.*



overlapping holes as needed to remove most of the remaining waste.

Plunge and lever

With most of the waste drilled out, mark the depth of the mortise on the chisel blade. Place the tip of the cutting edge into the scribe line on one end with the bevel facing away from the end. Make sure the chisel is plumb. Also, with thin stock, it's a good idea to clamp the sides of the stock at the mortise so it won't split.

Now, use the mallet to pound the chisel to the full depth. Keep the chisel plumb as you go (see tip, facing page).

Once you reach the full depth, lever the chisel forward, toward the opposite end of the mortise. This is where the rectangular chisel pays big dividends. Because the chisel sides are parallel, their leading edges slice away—in one quick motion—a good portion of the waste at one end. Repeat the cut-and-lever technique on the opposite end. If the wood is hard, use both hands and lean into the chisel a bit.

Just a bit of cleanup left

You now have only a small triangular section of waste in the middle of the mortise. Since this is mainly a paring operation, use a normal, bevel-edged bench chisel. Simply start at the top of the waste triangle and carefully pare down to the bottom. Use the mortise chisel to clean up what remains. □

Christian Becksvoort is a contributing editor.



Tip

No drill press? Use a doweling jig. It's nearly as fast and just as accurate as a drill press.



Step 3 THE MORTISE CHISEL TRICK



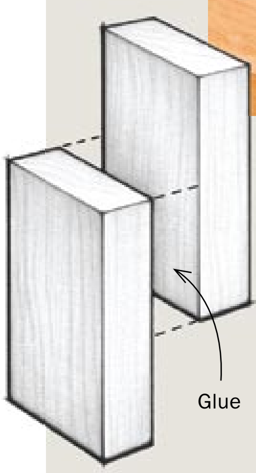
Mark the depth. *With an ink marker and a square, mark the mortise depth on the blade of the chisel.*



Drive the chisel. *Place the tip of the chisel into the cut line on one end of the mortise (bevel facing away from the end), then use a mallet to drive it to the full mortise depth.*



Lever the chisel. *Lever the chisel toward the opposite end of the mortise. As you do, the square corners of the mortise chisel shave a good part of the waste stock. Repeat from the other end. The levering trick removes all but a small triangle of waste (see drawing, left).*





Tip

If keeping the chisel plumb is a problem, clamp a block of wood to the workpiece. Hold the blade against the block and you can drive the chisel knowing it's aligned perfectly.



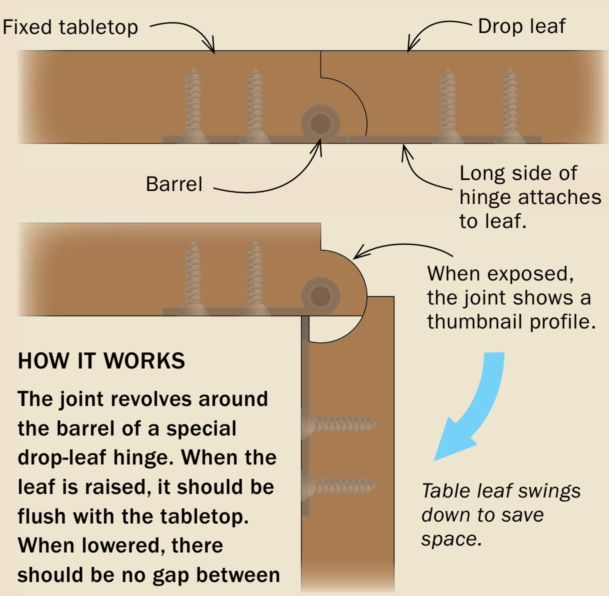
Step 4 FINISH WITH A BENCH CHISEL

Clean out the last of the waste. *A bench chisel removes the remaining triangle. Elapsed chiseling time for both the mortise and bench chisels: one to two minutes.*

The Rule Joint Done Right



Anatomy of the joint



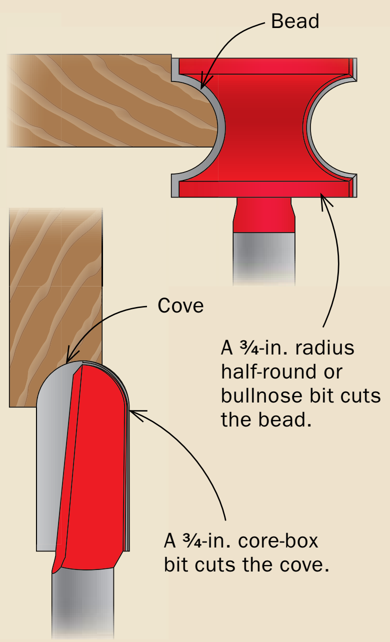
HOW IT WORKS

The joint revolves around the barrel of a special drop-leaf hinge. When the leaf is raised, it should be flush with the tabletop. When lowered, there should be no gap between the parts.

A PAIR OF ROUTER BITS MAKES THE JOB EASY



For the two halves of the rule joint to meet without a gap, it is critical that the radii of these two router bits match exactly.



Attractive drop-leaf joint revolves around precise layout and matching router bits

B Y M I C H A E L Z U B A

Most commonly found on drop-leaf tables, the rule joint allows the outside leaves to be lifted to create a large, useful surface, or folded down to save space. The beauty of this molded joint is that it looks attractive whether open or closed, and it keeps the hinges hidden.

You need to understand the mechanics of this joint in order to lay it out and cut it accurately, and project articles rarely go into enough detail. A rule joint consists of a board with a bead (typically the fixed top of a table) and a board with a cove, or cope (typically the movable leaf). When the joint is closed, the two boards meet tightly and on an even plane. As the leaf is lowered, the cove rolls evenly around the bead. Two or more hinges support the leaf. The secret is to place the center of the hinge barrel in line with the center of the bead.

Although you can create this joint with matching molding planes or shaper knives, the method I'll explain uses two widely available router bits. And construction is easy when divided into three main steps: Cut the bead, cut the matching cove, and finally, install the hinges.

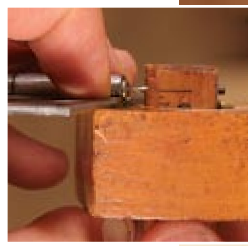
Dial in the setup on a sample board

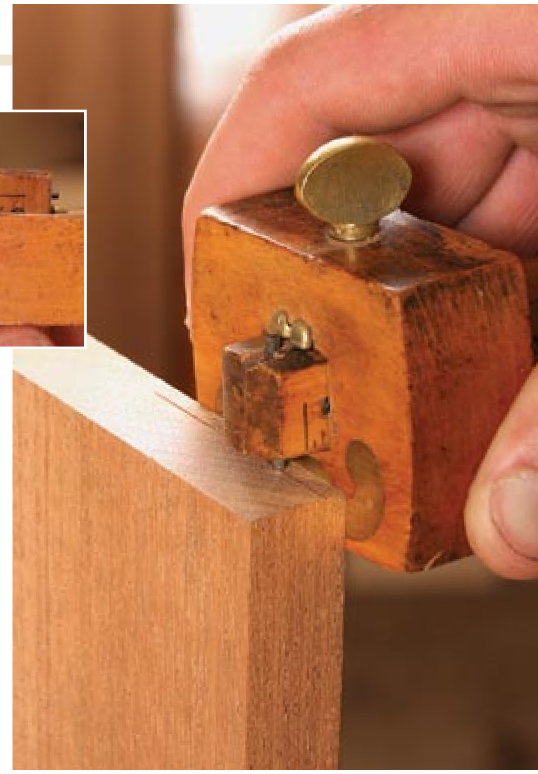
It is vital to the smooth operation of the rule joint that the boards remain flat and true, so rough-mill the boards a little oversize and allow them to rest in your shop for a week or so to make sure they are stable and don't cup or

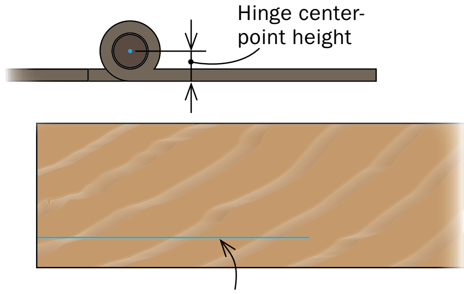
Lay out the bead

1 LOCATE THE CENTER OF THE HINGE

Because the joint revolves around the center of the hinge's barrel, you need to mark this location. Set a marking gauge to the distance from the flat side of the hinge to the center of the barrel, and scratch a line on the end of the sample board that will enter the router bit first.

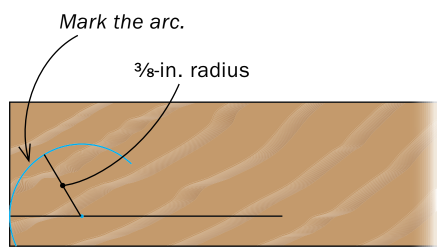






2 MARK THE ARC OF THE HALF-ROUND ROUTER BIT

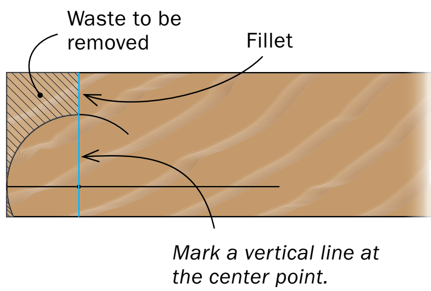
Set a compass to equal the radius of the half-round bit you'll be using, in this case ⅜ in. Place one point on the edge of the board and the other on the center-point line created in step one. Draw an arc of about 180°.





3 COMPLETE THE LAYOUT

Drop a line at right-angles to the center point. This gives the location of the fillet, or straight section above the bead. The shaded area is removed on the router table to leave the beaded half.

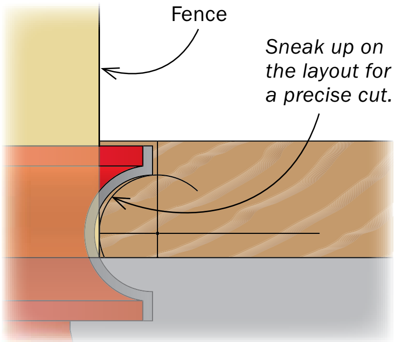




Photos: Mark Schofield; drawings: Kelly J. Dunton

Rout the bead

Fine-tune the setup. *Using the layout on the end of the sample board, set the half-round bit to the correct height. Make the first pass with the fence slightly forward, and then ease it back until the bead is cut perfectly.*







Bead the tabletop. *Now that the router has been set up using the sample board, clamp a hold-down board to the fence of the router table and cut the bead on both sides of the fixed tabletop (above). Because only a small amount of wood is being removed, you can cut each bead in one pass. If a thin strip of wood is left attached to the top of the fillet (right), cut it off on the tablesaw and carefully sand it flush.*



twist. Then mill them to final thickness, in this case ¾ in. I always mill a sample board to the same thickness as the tabletop and use it for layout and test cuts all the way through the process to ensure the rule joint fits properly. This makes me confident that everything will work when I start cutting my valuable tabletop.

The rule joint revolves around the barrel of the hinge, so start laying out the joint by setting a marking gauge to the distance from the flat side of a drop-leaf hinge to the center of its barrel (see "The right hinge for a rule joint," p. 72). The grain of the tabletop and the drop leaf runs parallel to the rule joint, so the layout is done on the end grain. Scribe a line along the end grain of the sample board, registering off the bottom edge of the board. Make sure you lay out the end of the board that will contact the router bit first on the router table.

I used a ¾-in. radius half-round or bullnose bit to cut the bead, so I set a compass to this distance. Put one point of the compass on the scribe line and the other where this line reaches the edge of the board. Now draw an arc of about 180° whose apex just touches the edge of the board. Use a knife and a square to mark a line perpendicular to the scribed line at the location of the compass point away from the edge of the board (see bottom drawing, p. 69). You now have established the location of the hinge and the profile of the bead.

I use a full half-round bit rather than a quarter-round beading bit because the half-round bit will cut a return past the centerline. If this is not cut, the bottom edge will bind as the leaf drops and the cope of the drop leaf will not roll evenly. You'll also need a ¾-in. radius core-box or round-nose bit, which should nest perfectly with the half-round bit. I used Freud bits 18-122 and 82-116, available at www.woodworker.com.

With the half-round bit mounted in a router table, use the sample board to set the correct height of the bit and then gradually move the fence back to sneak up on the exact line of the bead. Once set, clamp

Cut the matching cove



Transfer the layout. *Butt the tabletop to a fresh edge of the sample board with the fillet in line with that uncut edge. Transfer the outline of the bead.*



Saw away the waste. *Use dado blades to cut away the bulk of the waste in what will become the cove.*



Set up to cut the bead. *Align the sample board with the round-nose bit, but make the first cut with the bit slightly too low.*

a hold-down board to the fence, and make the cut to both sides of the fixed part of the tabletop. With a sharp bit, you can do this easily in one pass. Depending on the thickness of the board, you may be left with a thin strip of wood attached to the fillet (the vertical surface above the bead). Cut this away on the tablesaw and clean up the edge with sandpaper wrapped around a block, using a light touch. With the bead side complete, the next step is to cut the matching coves on the leaves.

Sample board strikes again

To get the approximate location of the cove, I butt the beaded board against the uncut side of the sample board and trace the bead onto the end of the board.

Remove the bulk of the waste with a ¼-in.-wide dado blade on the tablesaw, staying away from the traced line. This will prevent the core-box bit from having to make too large of a cut in a single pass. Set up the router table with the ¾-in.-dia. core-box bit. Use your sample board to make a trial cut just below the outline you drew. Now check the fit of cove to bead, and raise the height of the bit accordingly. The cut should produce a cove that perfectly matches the bead when the boards are mated on a flat surface.

When set up, I take a secondary fence and align it parallel to the primary fence with the sample board as a spacer. This fence acts like a featherboard to keep the



Check the fit. *After the first cut, the bead and cove should nest perfectly, but the coved sample board should still sit a little higher than the beaded board. Sneak up on the cut until the two boards are level.*



Cove the drop leaves. *Once the sample board is right, clamp a second fence to the router table so that the wide leaves won't wobble as they pass the router bit.*

Install the hinges

The right hinge for a rule joint



A regular hinge with its barrel in the middle won't work for this type of joint. Instead you need a drop-leaf hinge with sides of different lengths. The short side is attached to the beaded board, while the longer side is attached to the drop leaf so that the underside swings under the beaded board.

SOURCES OF SUPPLY

DROP-LEAF HINGES
www.horton-brasses.com
www.londonderry-brasses.com

FLATTEN THE HINGE IF NECESSARY



How to check it. *The drop-leaf hinge should sit flat with the barrel facing up (top). If the leaves rise up as they approach the barrel, the hinge may not work properly.*



Gentle persuasion. *Hold one leaf tightly in a vise and use a block of wood and a hammer to gently straighten the leaf.*

LAY OUT THE POSITION







Inset the hinge. *Set a marking gauge to the distance from the edge of the bead to the vertical line below the fillet (1). This marks the center of the hinge barrel. Scratch a line where the hinges will be centered (2). Then clamp the drop leaf to the tabletop, and locate the hinge upside down straddling the joint, with the barrel centered on the scribed line (3). Mark the outline deeply with a knife.*

CUT THE MORTISE





Set the router depth. *Set the depth of a straight bit to match the thickness of a hinge's leaf. Clean up the recess after routing away the bulk of the waste. Use a chisel to square up the sides of the hinge recess (right).*

ATTACH THE HINGE


1


2


3

One last cut, and it drops in. *Use a carving gouge or a chisel to cut a trench for the barrel of the hinge (1). Use full-threaded screws to attach the hinge to the tabletop and the drop leaf (2). Check that the two surfaces of the rule joint remain parallel throughout the movement with no binding or unsightly gaps (3). A bit of sanding smooths out the action.*

leaf tight to the fence, ensuring a smooth, consistent cut. With the beads and coves cut, you can move on to the hinges.

A rule joint hinges on the hardware

Locating and installing the hinges is the most critical part of the process. The first step is to determine the number of hinges. For smaller pieces such as a Pembroke table, I use two hinges. For large tables such as a William and Mary gate-leg or a dining-room table, I would use up to four.

Set a marking gauge to the width from the edge of the bead to the vertical line you drew during layout. Now take the actual tabletop, and scribe a line along the underside of the bead to mark the centerline of the hinges.

Clamp the top and a leaf together, face down. Now place the hinge upside down with the barrel in line with the scribe mark. Using a knife, outline the location of the hinge across both boards. Set up a router with a ¼-in. straight bit and adjust the depth of cut to the thickness of the hinge leaf. Separate the boards and rout away the waste, staying away from the knifed line. Then clean up the walls with a chisel.

To make room for the hinge barrel, I use a #8 carving gouge to create a round-bottomed trench. You also could use chisels to create a straight-sided recess.

Set the hinge in the mortise to check that no part of the hinge projects above the bottom surface of either board. Fasten the hinge with appropriate screws and swing the leaf to check the fit. You may have to sand the surfaces very lightly, but that should be the limit to your fine-tuning.

Although this joint takes patience, you'll see the reward on your next table, whether the leaves are open or closed. □

Michael Zuba builds custom traditional furniture for Kinloch Woodworking in Unionville, Pa.



5 Overlooked Woods

Well-known out West, but available everywhere

BY ANISSA KAPSALES

Growing up in the East with an interest in furniture making, I was aware of the typical furniture woods—oak, walnut, maple, and my favorite, cherry. Then I learned about a few of the "exotics"—mahogany, teak, ebony, rosewood—and I was excited about the new colors and textures. However, these woods come with big question marks for me: How sustainable are the harvest practices? Should I care about that? Also, I like the idea of using wood grown closer to home, or at least on the same continent. I can't say I've never used exotics, but I always have pangs of environmental guilt.

Just when I had resigned myself to the charming but usual local-wood suspects, I spent a year living and making furniture in northern California. There, I discovered five fantastic local woods: alder, bay laurel, madrone, tanoak, and claro walnut. Of these five, alder is the easiest to find in lumberyards across the country because it is the only one grown as a commercial timber product. The other four come primarily from private landowners and smaller lumber mills. But because of the Internet, these woods are now simple to find and order online, and are becoming increasingly available around the country as solids and veneers.

Without turning to expensive exotics, harvested with questionable methods in faraway lands, you can choose from among these five Western woods and add new colors, hardnesses, and textures to your furniture that you won't find anywhere else.

Anissa Kapsales is an associate editor.

A wood's **specific gravity** speaks to how hard, dense, and heavy it is. The specific gravity is a comparison of the weight of the wood with the weight of an equal volume of water. The higher a wood's specific gravity, the more it weighs and the harder and stronger it should be. As examples, black cherry has a specific gravity of 0.47; poplar is 0.40, and red oak has a specific gravity of 0.56. In woodworking this means that poplar is softer and easier to work by hand and with machines than black cherry and oak.

BEHIND THE NUMBERS

It's important to identify a wood's hardness, workability, and proclivity to warpage and checking. The best way to express these qualities, without using subjective terms such as fair, good, hard, or soft, is (much to my dismay) with numbers. More information about wood shrinkage can be found by visiting www.fpl.fs.fed.us.

Tangential shrinkage is the amount wood shrinks tangentially (parallel to growth rings and perpendicular to the grain). Black cherry shrinks 7.1% tangentially as it dries, poplar 8.2%, and red oak 8.6%.

Radial shrinkage is the amount wood shrinks radially (perpendicular to growth rings). Black cherry shrinks 3.7% radially as it dries, poplar 4.6%, and red oak 4.0%.

Photos, except where noted: John Tetreault; facing page: Kerry Marshall (top), Jay Odee (bottom)



Tanoak

The oak imposter

Tanoak is not a true oak; in fact, it belongs to the beech family. But it has characteristics similar to oak. For one, the fruit looks like the acorn of the oak tree, but with a woolly or spiny cap rather than the scaly cap of the true acorn. Also, the wood itself somewhat resembles oak. It is exceptionally hard and heavy, though, with finer grain and lighter, more uniform color than the true oaks, ranging from a creamy white to a light tan. The grain can be very straight, with a mix of traditional oak characteristics such as prominent wide rays on quartersawn surfaces.

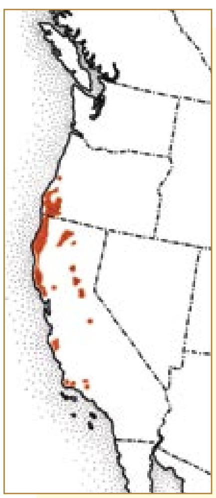
Tanoak is hard and brittle (more so than the oaks), dulling tools quickly and chipping out easily. The way to manage tanoak is to keep your cutting edges sharp and your patience level high. Taking light passes with a handplane or a router bit and sneaking up on a fit or profile will help eliminate chipout. Tanoak sands well and takes finishes even better.



Tansu in tanoak. *This small chest (18 in. deep by 18 in. wide by 11 in. tall) made by Kerry Marshall reveals interesting character on the front and the more common, subtle side of tanoak on the rest of the box.*



Manage the brittle wood. *Tanoak chips out easily, but multiple light passes with a well-sharpened block plane make chamfering the edge of this tabletop easy.*



HEALING TREE

Tanoak, known as the healing tree, has a long history in Native American culture as well as in the leather industry of northern California. Tanoak is high in tannin, a natural chemical used in the tanning process of leather and a necessary ingredient for fuming and ebonizing wood, making tanoak an ideal candidate for both.

Latin name: *Lithocarpus densiflorus*
aka California chestnut oak, tanbark oak

Average price: $2–$4 bd. ft.

Specific gravity: 0.58

Percent shrinkage, green to kiln-dried:
Tangential 11.7
Radial 4.9
Tangential/radial ratio 2.38

The **percent shrinkage** indicates how stable a wood will be. There are three numbers to consider: tangential and radial shrinkage, taken on their own, and the ratio of the two.

As the **ratio of the tangential to radial shrinkage** gets higher, wood is more prone to warping. Black cherry's T/R shrinkage is 1.92, poplar's is 1.78, and red oak's is 2.15. As you are deciding where to use woods, consider their T/R shrinkage. A wood with a very high T/R might not make the best door panel or solid tabletop.



Strong and sturdy. *Dan Stalzer, a woodworker who teaches chairmaking in Fort Bragg, Calif., uses tanoak almost exclusively because of its color, strength, and durability. This chair has an oil finish.*

Illustrations: Bobbi Angell



Vibrant and colorful. This tabletop apothecary made by Martin Shelton displays the variety of colors that can be found in a small section of one board. Shelton paired the bay laurel on the drawer fronts with a black-oak carcase and finished the piece with shellac.

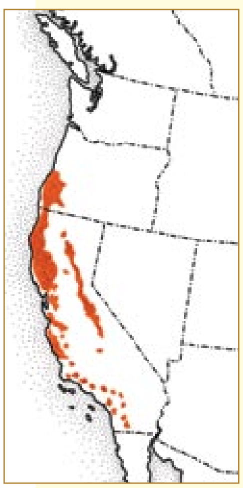


Bay laurel

Color and character abound

The best reason for using bay laurel is its colors, which range from blond to black with many shades of gold, brown, gray, and red in between. There isn't a strong distinction between the heartwood and the sapwood. It's not uncommon to see vivid dark streaks and figure running through the wood. Once, while resawing a board for veneers, I was astounded by the character and pigment that were revealed in each layer. With age, the colors mellow and blend somewhat, taking on golden tones while still maintaining variations.

Bay laurel is heavy, durable, and hard with very fine grain. It tends to have swirly, interlocked grain that tears out. The trick to machining and handplaning bay laurel is sharp blades and light passes. Unfortunately, this wood dulls tools quickly. Depending on the specific piece, a sharp scraper could work well, but sanding is your safest bet. Work methodically through the grits to avoid visible scratches on this fine-grained wood. Bay laurel is finicky, but the results are worth the extra care. The grain and colors pop and shimmer when finish is applied, and it takes finishes very well. Because it is so distinctive, bay laurel is a great choice when building a piece with a subtle design that allows the wood to be the star.



HEADACHE TREE

Bay laurel is related to the Mediterranean laurel (*Laurus nobilis*), source of the aromatic bay leaf you find in the spice section at the grocery store. But the leaf of a California bay laurel is much more potent. Bay laurel is sometimes called the "headache tree" because the smell of the leaves can be so strong that it causes headaches. The wood itself is pleasantly fragrant, especially during milling and working.

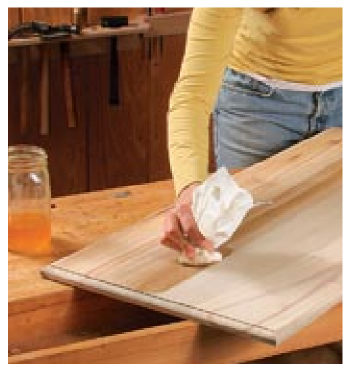
Latin name: *Umbellularia californica*
aka myrtle, pepperwood, Oregon myrtle

Average price: $4–$7 bd. ft.

Specific gravity: 0.51

Percent shrinkage, green to kiln-dried:
Tangential 8.1
Radial 2.8
Tangential/radial ratio 2.89





Prep the surface for finishing. Bay laurel's interlocking grain can tear out easily, so you may end up sanding it (left). Super-blond shellac (right) brings out the colors without changing them and can be used under oil finishes to add protection (providing that it is dewaxed).



Wood and design working together. Aaron Levine used very plain bay laurel for the legs and stretchers of this table. However, he used a very colorful, highly figured piece for the top. He kept the form simple so the wood would have the most "voice." The finish is varnish.

Photos, this page: David Welter (top left); Art Grice (bottom right)

Madrone

Pretty in pink



Madrone wood is gorgeous, ranging from a creamy light pink to a reddish brown. It's extremely hard, fine-grained, and uniform in texture, with interesting fleck patterns.

Although they need a lot of light, madrone trees thrive in dense stands because they will grow—leaning, twisting, and bending—toward the sunlight. This drive to survive creates a complication for woodworkers. Because the tree doesn't always grow straight, the wood can be under tension and warp during drying. This can be controlled by pre-steaming, closely spaced stickering, and slow air drying prior to kiln drying, but unless you have a good relationship with your supplier, it is difficult to know if this has been done. Adding to this, madrone has a higher water content when green (68% to 93%) than most other woods, so of the woods described here, it shrinks and warps the most during drying, decreasing stability. Quartersawing minimizes shrinkage, and using veneers and preemptive design consideration helps, too. All that aside, madrone is a pleasure to work with.

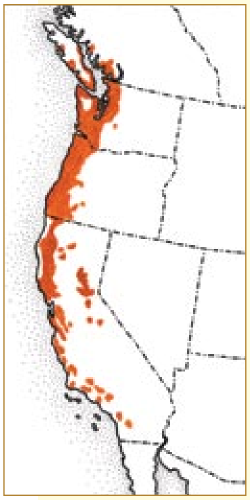
Despite its hardness, madrone machines exceedingly well and doesn't dull tools excessively. It's a very dense wood, so slow down the feed rate while machining. Handplaning or scraping madrone can be a huge ego boost, as you can produce thin, lacy shavings with almost any cutting angle, leaving a beautiful, polished surface. Sanding is tricky because the fine texture of the wood will show scratches, but if you are set on sanding, work through the grits to P320.



Strong joints. *Anders Whealdon chose madrone for the elegant lines of this chair, designed by Ejler Hjorth-Westh. Madrone is very hard with exceptional strength, making it an ideal wood (when dried properly) for chairs.*

HARDY EVERGREEN

The madrone is a beautiful evergreen with distinctive red, peeling bark, under which is a smooth green skin. Madrone trees are hardy and drought-tolerant because the root systems can be far reaching and abundant, tapping up to 12 ft. in fractured bedrock and holding soil in place. This makes the madrone tree excellent for controlling erosion. The tree flowers in the spring, and berries form late in the summer, providing food for birds.



Latin name: *Arbutus menziesii*
aka Pacific madrone, strawberry tree

Average price: $4–$7 bd. ft.

Specific gravity: 0.58

Percent shrinkage, green to kiln-dried:
Tangential 12.4
Radial 5.6
Tangential/radial ratio 2.21

Online Extra

For an audio slide show of pieces made with these woods, go to **FineWoodworking.com/extras.**



Plane fun. *While madrone works easily with machines, it's particularly satisfying to work by hand with a scraper or a handplane, creating a highly polished surface that will take finish exceptionally well.*



Outmaneuver wood movement. *The inspiration for this buffet came from the wood. Judith Ames wanted to highlight the even pink color and figure of the madrone. She combated any possible instability by using veneer on the top, sides, and door panels, paired with properly kiln-dried solid wood for the rest. The finish is lacquer.*

Photos, this page: David Welter (top right); Robert McCrory (bottom right)



Claro walnut

Walnut at its best

There are good reasons why eastern black walnut (*Juglans nigra*) is such a popular furniture wood. It's a consistently straight-grained, beautifully colored wood that is hard and durable without being excessively heavy. It's easy to work by hand and machine, and it finishes beautifully.

Now take all those fantastic attributes and add more color, interesting swirls, and figure, and you get claro walnut (*Juglans hindsii*). While you're adding, throw some extra cash into the mix. Claro walnut is pricier than black walnut, but it's worth it. The rich colors of this wood range from medium brown to dark chocolate brown, and it often has purple or reddish striping, gold hues, or whitish marbling. Because of the colors and figure, claro walnut is often used for gun stocks.

It isn't a big surprise that claro walnut is a favorite of many woodworkers, including Sam Maloof and George Nakashima. In fact, Nakashima was known to travel from Pennsylvania to California specifically to look over trees and purchase spectacular slabs of claro walnut.



Careful composition. *Ted Blachly designed this unadorned secretary to let the claro figure and color stand out. The grain of the wood requires that parts be chosen and placed carefully. The finish is varnish.*



Scrape the swirls. *Much like Eastern black walnut, claro works easily with machines and hand tools. But anywhere there is a lot of swirl or figure, you may need to use a scraper or rasps, files, and sandpaper to tame tearout.*

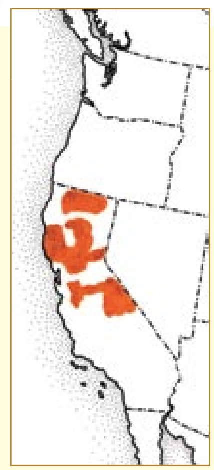


Warm it up. *Orange shellac enhances the already rich, warm colors of claro walnut and can be used as a sealer under other finishes.*



Handwork triumph. *Don Gray made this shoe-changing bench from solid claro walnut. The swirly grain was challenging, but he managed to rough out the curved parts with handplanes, refining the shapes further with a round-bottom plane and a scraper. The finish is an oil-based polyurethane.*

CLARO CONFUSION



There is a lot of conflicting information about claro walnut, much of it misinformation. To clear up the confusion, I went to forestry expert John Shelley at the University of California, Berkeley. Claro walnut, commercially important as rootstock for English walnut orchards, is a real species of wood, native to northern California. The native species of walnut in California is *Juglans californica*. That seems simple enough, but the claro confusion comes from the distinction between the northern and southern varieties. The northern variety (*Juglans californica var. hindsii* or *Juglans hindsii*) is the highly figured, richly colored wood I'm referring to here. The southern variety (*Juglans californica var. californica*) is more like eastern black walnut.

Latin name: *Juglans hindsii,* aka Hinds black walnut

Average price: \$6–\$20 bd. ft.

Specific gravity: 0.51

Percent shrinkage, green to kiln-dried:

Tangential 7.8

Radial 5.5

Tangential/radial ratio 1.41

Photos, this page: Dean Powell (top right); John Birchard (bottom left)



Alder's traditional face. *The warm color and subtle grain of alder lend themselves to traditional work. This blanket chest made by Josh Finn (finished with a three-part oil mixture) captures the conservative characteristics of the wood.*

Alder



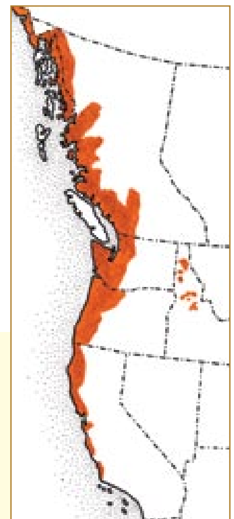
Way better than its reputation

Alder, a member of the birch family, is a beautiful wood that has gotten a bad rap—being dubbed "poor man's cherry." Because it is fast-growing and abundant (therefore inexpensive) and takes stain and other finishes exceptionally well, many cabinetmakers stain alder and pass it off (knowingly or not) as cherry.

Left natural, this fine-grained wood has a warm amber color with reddish tones. There is little or no difference between the heartwood and sapwood, so the color and texture tend to be very uniform and the grain is fairly straight. Select-grade alder is not visually overpowering, so it will never distract from the design of a piece. If that sounds mundane, knotty alder is also widely available and can add a different interest to the wood.

Alder is on the softer side of hardwoods (close to mahogany) and tends to decay quickly in the elements, so it is not a good choice for outdoor applications. But it is wonderful for furniture and turnings. It's very stable, machines well, is a pleasure to work by hand, and doesn't dull blades excessively.

The light, warm color doesn't darken quickly as cherry does. It tends to age and color more like maple: warmly and very slowly, not changing much with time.





User-friendly. *Because alder isn't extremely hard, it isn't a chore to chop a lot of dovetails in it, and it won't have you turning to your sharpening station every 10 minutes.*

RED INSIDE

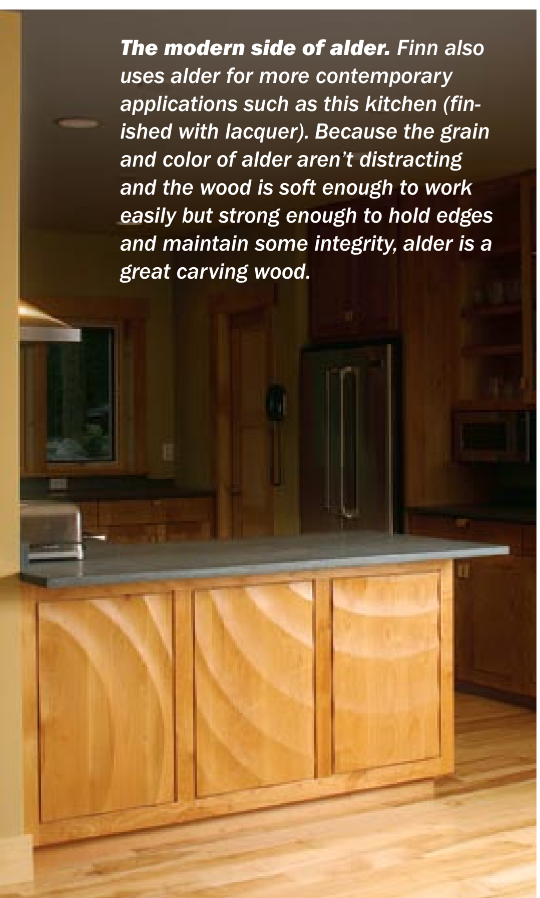
Red alder actually has extremely white bark like the palest of birches, only it doesn't peel as a birch does. Scratching through the outside layer of the bark reveals a rich red, and the wood (nearly white when first cut) turns a reddish amber as it is exposed to air. Alder also plays an important ecological role; it's known as a nitrogen fixer because its root system hosts a bacterium (*actinomycete Frankia*) that draws nitrogen from the air and enriches the soil, benefiting nearby plants and organisms.

Latin name:
Alnus rubra
aka western alder,
Oregon alder,
Pacific coast alder

Average price:
$3–$5 bd. ft.

Specific gravity: 0.37

Percent shrinkage, green to kiln-dried:
Tangential 7.3
Radial 4.4
Tangential/radial ratio 1.65



The modern side of alder. *Finn also uses alder for more contemporary applications such as this kitchen (finished with lacquer). Because the grain and color of alder aren't distracting and the wood is soft enough to work easily but strong enough to hold edges and maintain some integrity, alder is a great carving wood.*

HOW TO GET WESTERN WOODS



If you can't find these woods locally, you'll have to have your order shipped, sight unseen. Many suppliers have photos online, but you still must rely on them to send nice wood (a subjective thing), charge a fair price, and send it in a timely, cost-effective manner. It's helpful to know your supplier. Get recommendations from other woodworkers, or start with a small order as a test. Call and talk with somebody about what you want. If the person on the other end is knowledgeable and helpful, you are off to a good start. A few suppliers that I have used successfully are Almquist Lumber (www.almquistlumber.com); Whitethorn Hardwoods (www.whitethornconstruction.com); and, for claro walnut, Burls and More (www.burlsandmore.com). You can also go to www.woodfinder.com.

Don't mail-order wood when you are pressed for time. Wood orders are heavy and can cost a lot to ship by air. Have the order shipped ground, a slower but cheaper option.

readers gallery

DESMOND NAULT
Carmel, Calif.





For his first project at the College of the Redwoods, Nault made this madrone jewelry box on a jatoba stand (12 in. deep by 16 in. wide by 42 in. tall). The two biggest challenges, he said, were cutting the compound-angled dovetails for the tapered carcase and making the curved lid. Nault curved the lid without coopering it by using an extremely cupped piece of 8/4 madrone, removing a little bit of material once a week and letting the wood settle before working it again. The finish is shellac. PHOTOS: DAVID WELTER



MICHAEL BELL
Vicarstown, County Laois, Ireland

Bell makes warm, solid-wood contemporary furniture using traditional construction methods. He collaborated with Susan Zelouf on the design of this sideboard (18 in. deep by 110 in. wide by 31 in. tall), part of a large commission of furniture for the Irish embassies in The Hague, Netherlands, and Lisbon, Portugal. The carcase and drawer fronts are cherry, the door panels are Australian silky oak, and the drawer sides and bottoms are maple. The finish is hand-rubbed matte lacquer. PHOTO: ROLAND PASCHHOFF

Submissions

Readers Gallery provides design inspiration by showcasing the work of our readers. For consideration, send entry forms (available at www.finewoodworking.com) and photos (unaltered digital images, prints with negatives, or slides) to Readers Gallery, *Fine Woodworking,* 63 S. Main St., Newtown, CT 06470. If you want materials returned, you must include a self-addressed envelope with appropriate postage.

KIMBERLY WINKLE
Smithville, Tenn.

These tables (16 in. dia. by 22 in. tall), called "Tit for Tat," are made of poplar, and mahogany offcuts from a guitar manufacturer. Winkle used spindle-turning and bowl-turning techniques to make the parts for the base. She added color and patterns with milk paint, graphite, and Prismacolor pencil. The tabletops were finished with Waterlox Original Sealer and Finish, and the pedestals were sprayed with polyurethane to prevent the pencil lines from smudging. PHOTO: JOHN LUCAS





TJEERD HENDEL-BLACKFORD
Barnstaple, Devon, England

Hendel-Blackford was commissioned to build a contemporary writing desk to fit in a traditional setting. The client, a priest in Scotland, wanted a place to sit and write his sermons. The brown-oak desk (30 in. deep by 35 in. wide by 35 in. tall) has drawer sides and bottoms made of cedar of Lebanon, and an Italian-leather writing surface. The finish is Danish oil and wax.



TIMOTHY CLARK
Waltham, Vt.

Clark built this cherry sideboard to match an existing dining-room set. To accommodate a small dining room, he squeezed the depth to 18 in. rather than the standard 22 in. The width is 68 in. and the height is 43½ in. Starting with a simple design, he added subtle details: beading around the doors and drawers, a cove underneath the top, a cove in the backsplash, and ebonized cherry knobs. The finish is Bartley's gel varnish.



MICHAEL TORISON
New London, Minn.

Torison made this demilune table while attending the two-year program at North Bennet Street School in Boston. He said the most difficult parts of the construction were turning the three identical legs and cutting the joinery on the curved aprons. The pommele sapele table, finished with super-blond shellac, is 15 in. deep by 30 in. wide by 30¾ in. tall.



BRIAN BORTZ
Durham, N.C.

This bow-sided buffet (21 in. deep by 54 in. wide by 35 in. tall) was inspired by the Art Deco era. Bortz used pommele eucalyptus, Macassar ebony, and cherry to create the contrast in color and grain. The finish is water-based conversion varnish.

PHOTO: GREG PLACHTA



PHILLIP ROBERT CADMAN
Durban, South Africa

Cadman's passion is making 1/12-scale exact furniture replicas, and he never makes the same piece twice. This grand piano, "Ministein," is 6¼ in. deep by 4¾ in. wide by 3⅓ in. tall. The keys and foot pedals function on springs, and the handmade brass casters swivel and roll. The piano case and black keys are ebony, the white keys are maple with ivory veneers, and the finish is high-gloss polyurethane.



JIM SCHMIDT
Healdsburg, Calif.

This mahogany cradle was a gift for Schmidt's first grandchild. Drawing from his experience as a packaging designer, Schmidt used a Cut-All tool to do the scrollwork. The tool, made to cut through thick cardboard, is a lot like a jigsaw, but while the blade goes up and down as a jigsaw does, it also swivels. Standing 28 in. deep by 44 in. wide by 34 in. tall, the cradle is finished with two coats of wax.



THE MOSER EFFECT

The Center for Furniture Craftsmanship in Rockport, Maine, is holding a Thomas Moser reunion from Sept. 12 through Nov. 28, highlighting the work of current Moser cabinetmakers and furniture makers who worked with Moser earlier in their careers. Thomas Moser Cabinetmakers started as a one-man shop 36 years ago and now has nearly 100 skilled woodworkers. The cherry and ash chair at left is one of Moser's signature pieces. The rest are a few pieces that will be featured in the show.



KEVIN RODEL

Brunswick, Maine
Worked at Moser: 1979–1985

Inspired by a photograph of Charles Rennie Mackintosh's washstand (currently at the Metropolitan Museum of Art in New York City), Rodel knew he had to build his own version. He used fumed white oak, glass, and tiles to create the sideboard (20½ in. deep by 57 in. wide by 63½ in. tall). The art-glass back is an exact copy of the glasswork on the original, and the finish is linseed oil. PHOTO: DENNIS GRIGGS



STEWART WURTZ

Seattle, Wash.
Worked at Moser: 1977–1979

Wurtz built this bench for the entryway of a contemporary house. To give the bench (18 in. deep by 48 in. wide by 17 in. tall) a modern feel, Wurtz kept a simple form and used contrasting woods, big-leaf figured maple and wenge. The stretchers are stainless steel; the finish is lacquer. PHOTO: GREG DIANICH



PETER G. THOMPSON

Cornville, Maine
Worked at Moser: 2004–2005

Drawing from his experience working for the Federal Atlantic Salmon Restoration program, Thompson recalled the lines of a fish's tail fin to create the line of the back support. The back legs were cut and shaped from 7-in.-wide, 16/4 boards, eliminating the need to laminate or steam-bend. Finished with linseed oil and paste wax, the walnut and zebrawood chair is 23 in. deep by 26½ in. wide by 40 in. tall. PHOTO: MARGIT STUDIO

Q&A

Concealing sapwood

Q: I have an attractive, wide piece of walnut that I would like to use for a small tabletop. However, it is marred by a streak of sapwood in one corner. Is there a way to conceal it without the repair looking worse than the problem?

—FELIX DUMAS, Chicago, Ill.

A: THE CONTRAST BETWEEN PALE SAPWOOD and darker heartwood is an issue with both walnut and cherry. With the prices for these furniture hardwoods so high, it doesn't make economic sense to try and exclude all the sapwood from your project. One option is to use the sapwood thoughtfully, making it part of the design. The other is to disguise it. The good news is that there's a quick, simple, and effective way to conceal sapwood. As with all finishing, you'll need a sample board of the same species and ideally from the same board as the workpiece, on which you can experiment.

First, wipe the workpiece and the sample board with denatured alcohol. This will show what the wood will look like with a clear finish and how dark you need to dye the sapwood to make it blend in with the heartwood.

Next, mix up a dye that is close to the color of the alcohol-wetted heartwood. The most inexpensive dyes are powders that dissolve in water. Sources include www.wdlockwood.com and www.woodworker.com. Don't use pigment stains, as these will muddy the appearance of the wood. Test the color on the sapwood of the sample board and, if necessary, tweak it. In this case, I used Lockwood's walnut crystals for the dark brown color, but added a very small amount of rose pink to match the underlying tone in the heartwood.

If anything, err on the side of a sapwood that's slightly darker than the heartwood rather than lighter, as the eye detects light areas more easily than darker ones. When the dye dries, it will appear much darker than the heartwood, but as soon as a clear finish is applied the two areas will blend into one and no one will know your secret.

—Peter Gedrys is a professional finisher.



The sapwood revealed. *Wiping the surface with denatured alcohol reveals what the walnut's dark heartwood and the pale sapwood will look like under a clear finish.*





Find the color that matches. *Test dyes on a piece of scrapwood until you find the perfect match. Be sure to keep the heartwood wet so you can see the true color you are trying to match (above). Then apply the dye, or combination of dyes, to the actual workpiece (right).*



The sapwood concealed. *When the dye dries, it will appear darker than the heartwood, but the two will blend together when a clear finish is applied.*

Ask a question

Do you have a question you'd like us to consider for the column? Send it to Q&A, *Fine Woodworking*, 63 S. Main St., Newtown, CT 06470, or email fwqa@taunton.com.

Photos: staff



READER SERVICE NO. 63

READER SERVICE NO. 117

READER SERVICE NO. 3



Bamboo for you. You can purchase bamboo as paper-backed veneer, in various forms of plywood where bamboo forms the core and the faces, and as laminated slabs.

Tips for working bamboo

Q: Attracted to bamboo as a renewable resource, I decided to make a small table using bamboo flooring. I installed new blades in my planer and removed the ridges on the back of the 4-in.-wide strips and the finish layer on the front. I knew that bamboo is loaded with silicates, but was shocked at the condition of the blades after planing about ⅛ in. off of about 50 linear feet. After cutting the legs on the tablesaw, I tried to handplane the slight mismatches on the glued-up leg joints. I used very sharp blades at a high angle but still got extensive tearout. Scrapers worked but became dull so fast that they were not a realistic option either. Do you have any tips on how to work this green but gnarly material?

—DARYL BOUDREAUX, Wallingford, Pa.

A: I'VE WORKED WITH SOLID-CORE BAMBOO PLYWOOD and with sheets of bamboo veneer. I stack the former to get thicker pieces or, for thinner ones, resaw it on the tablesaw and bring it to finished size using a wide belt sander. I do not recommend putting pieces through a thickness planer, as you will get tearout regardless of feed direction.

For joinery, I've used dowels, biscuits, and slip tenons. When using through-tenons, I make them from bamboo. I use Titebond Original for laminating and assembling. I treat bamboo veneer like any other veneer, cutting and taping it to obtain the right size, and using Unibond 800 glue in a vacuum bag to apply the veneer. When trimming veneers, I use a standard carbide-tipped, flush-trimming router bit. I prefer to climb cut, which minimizes the splintering.

In short, carbide works well on bamboo but steel planer blades don't, and sanding is the best way to get surfaces with no tearout.

—David Ebner designs and makes contemporary furniture at his studio in Brookhaven, N.Y. (www.davidnebner.com). For a local supplier of bamboo, go to www.plyboo.com.



Hard but smooth. Bamboo is almost impossible to plane either by hand or machine, but it cuts very cleanly with carbide.

Special screws for hinges

Q: In his article "Use Screws Like a Pro" (*FWW* #195), Robert Settich recommends using "special" hinge screws. What are these and where can I get them?

—PHILIP HOUCK, Boston, Mass.



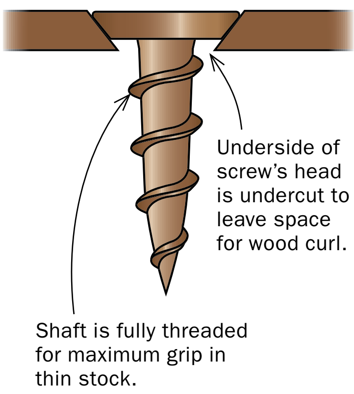
A: THE TWO FEATURES THAT SET hinge screws apart are the thread extending the whole length of the shaft, and the undercut head. Hinges are often set into thin pieces of wood requiring short screws. To maximize their holding power, the thread needs to extend right up the shaft instead of stopping a short distance from the head.

When you drive a screw, the threads can raise a tiny curl of wood that can prevent the head of the screw from fully seating. When the edges of an undercut head contact the hinge, there is a gap around the shaft that leaves room for that curl of wood.

Hinge screws are also very helpful when installing drawer slides, but unfortunately, there is a limited range of this type of screw. Lee Valley (www.leevalley.com) sells them with a zinc or antique brass finish, in ½-in. to ¾-in. lengths, but only with a Philips-head drive. McFeely's (www.mcfeelys.com) sells what appears to be an identical screw, but only in zinc and in fewer lengths.

—Robert J. Settich is the author of Taunton's Complete Illustrated Guide to Choosing and Installing Hardware *(The Taunton Press, 2003).*

HOW AN UNDERCUT SCREW WORKS

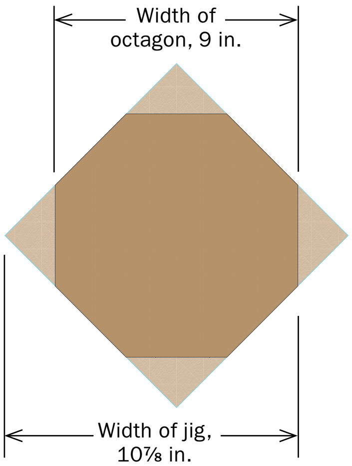


Drawings: Kelly J. Dunton

Cutting multi-sided shapes on the tablesaw

Q: I would like to cut a 9-in.-wide octagon on the tablesaw. How can I do this safely?

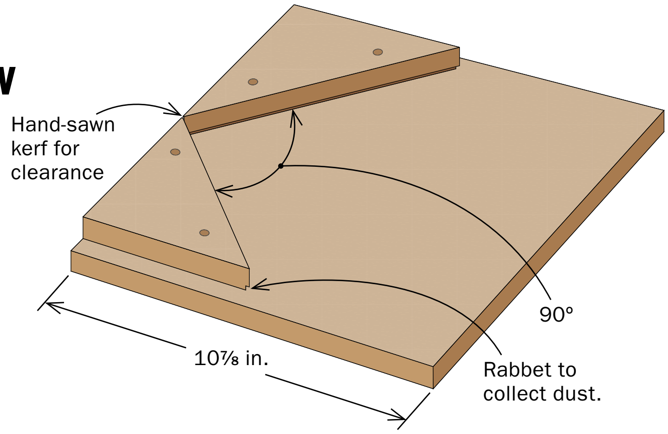
—STEWART LEVINE, via Knots online forum



A: FOR A 9-IN. OCTAGON, start with a blank that is 9 in. square. For the jig, begin with a plywood base ¾ in. thick by at least 9 in. long. To determine the width, multiply the side of a square by 1.41 (in this case, 9 × 1.41 = 12.69 in.). Subtract the 9-in. width from 12.69 in., and you get 3.69 in. This is the sum of two opposite corners of the square blank that will be removed to create an octagon. Divide 3.69 by 2 to get 1.84. Add 1.84 to 9, and the result is 10.84 or a hair less than 10⅞ in. This is the width of the jig and the distance from the fence to the sawblade.

Cut a pair of 45° triangles. Attach them to the jig as shown in the drawing. Use a backsaw to open a sawkerf gap where the two points touch. Place the blank in the jig, and cut off a corner of the workpiece. Turn the workpiece 90° and repeat three times to leave a perfect octagon.

—*Roland Johnson is a contributing editor.*





Cutting the octagon. *The first cut and the second are made with the opposite 90° corner fully nested in the jig. Before the third cut and the fourth cut, the opposite corner is already cut, so the workpiece doesn't reach fully into the jig.*

Pinned miter combines strength and beauty

BY RUSSELL JENSEN





On one of my many quests over the Internet for woodworking knowledge, I happened upon a fellow woodworker from Japan who had gone into great detail about traditional Japanese furniture joints. Of the 50 or so joints illustrated, one really caught my eye: The kane tsugi (literally, right-angle corner) joint is basically a miter and a pinned bridle joint fused together. After making many examples of the joint, I am still impressed at its incredible strength. Even without glue, the joint is almost impossible to move once you insert the pin.

Traditional Japanese joinery normally consists of a lot of painstaking handwork, but this joint can be created using a simple jig, some power tools, and a small amount of handwork—a nice combination.

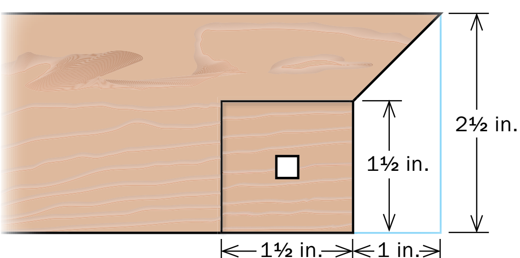
A simple jig for cutting the tenon

While milling the wood for the joint, mill an extra piece to the same thickness. This piece should be about 2 in. wide and at least 14 in. long, with parallel sides. Then, cut two pieces of ¾-in.-thick Baltic-birch plywood about 6 in. wide and as long as the piece of scrap. The plywood should come from the same sheet for consistent thickness.

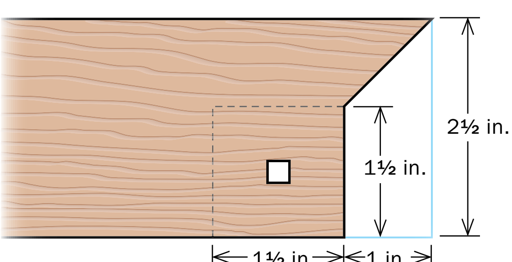
Now screw the two pieces of plywood to the scrap, leaving the scrap protruding about 1⁄16 in. on one side. After laying out the joint (see photos, below),

Five layout steps

Lay out both pieces that form the joint at the same time. Use the same settings on a marking gauge to ensure a tight-fitting joint.



TENONED PIECE



MORTISED PIECE





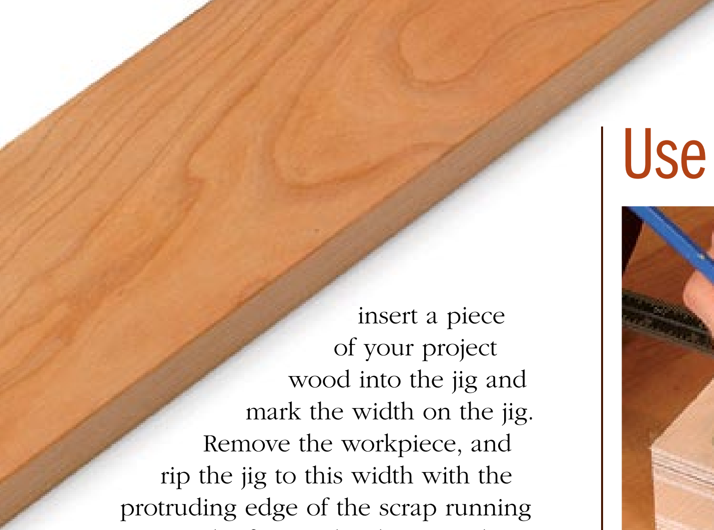
***Lay out the miters.** Draw a 45° line from the outside corner of both pieces (1). Where the 45° line meets the inside edge on the piece to be tenoned, mark the tenon's shoulder with a 1½-in.-long line parallel to the end (2).*





***Set a marking gauge to 1 in.** Scribe a line from the tenon's shoulder line to the end of the board (3). On the board to be mortised, use the same setting to scribe a line parallel to the end of the board (4).*

Photos: Mark Schofield; drawings: Kelly J. Dunton



insert a piece of your project wood into the jig and mark the width on the jig. Remove the workpiece, and rip the jig to this width with the protruding edge of the scrap running against the fence. Flip the jig and trim the scrap overhang. Finally, cut one end of the jig square.

You now need to cut away one corner of the jig to guide the router when cutting the tenon. You can either equip the router with a bushing guide or use a top-bearing straight bit. I use a bushing with an outside diameter of ⅝ in. to guide my ½-in.-dia. spiral upcut bit, so I have to make the opening 1/16 in. larger than the tenon. On the jig, I mark two lines using a square; the first 1 9/16 in. from the open side of the jig, and the second 2 9/16 in. back from the squared-off end. The extra inch is removed when the miter is cut. With the bearing-guided bit (Freud #16-520), the dimensions would be 1½ in. by



5 **Lay out the mortise and tenon.** *Working off both faces, center and mark the mortise (above), then use the same setting to mark the cheeks of the tenon.*

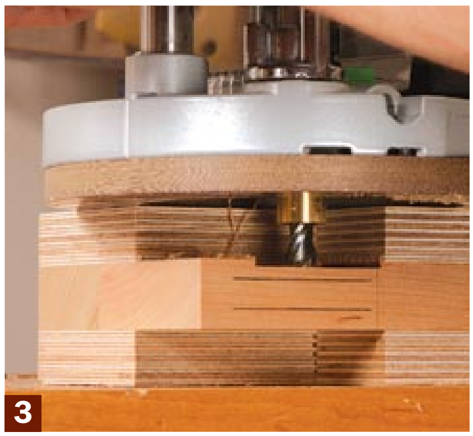
Use a jig to rout the tenon



1 **Lay out the jig.** *Create a tenoning jig by sandwiching a piece of wood the same thickness as the workpieces between two pieces of plywood. Then mark the corner to be cut away.*



2 **Bushing or bearing?** *For a bushing guide, the opening in the jig must be slightly larger than the tenon (above). For a bearing-guided bit, the opening should match the tenon.*

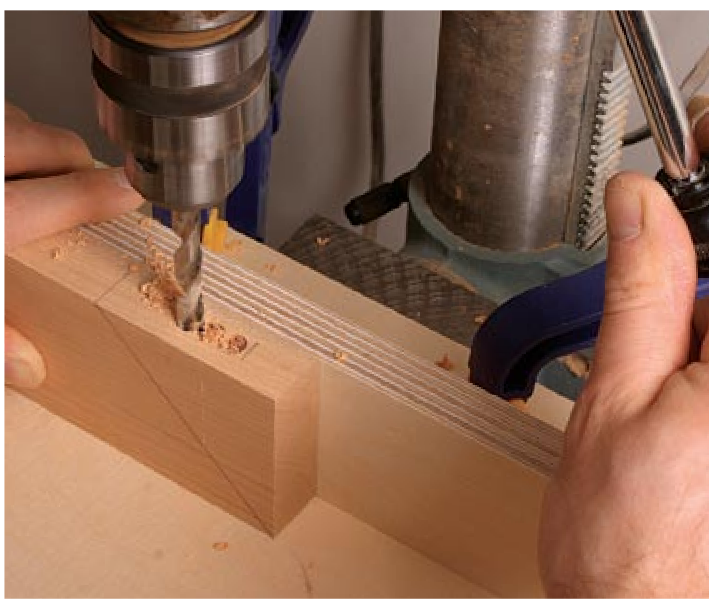


3 **Cut the tenon.** *Cut down to the layout line in stages. When the first cheek is cut, flip the jig and workpiece over and cut the other.*



4 **Square up the corners.** *Use a chisel to square the rounded corners left by the router bit. Work carefully, as this will be a visible part of the joint.*

Cut the mortise



Your choice. *With the joint laid out, cut the mortise using whatever method works best for you.*

Cut the ends and miters





Measure once, cut twice. *With the blade at the same height for both cuts, define the edge of the mortise and tenon on both pieces (right). Jensen uses a stop on his miter gauge to ensure uniformity.*



Safety first. *Before cutting the miter, remove most of the waste on the bandsaw to prevent the piece from catching on the tablesaw blade.*



Miter the tenoned piece first. *Sneak up on the right blade extension (height). It's OK if you nick the tenon a bit as this will be invisible later.*



Matching miter. *With the blade now set at the correct height, cut the matching part of the miter on the mortised piece.*

2½ in. Cut the opening on the tablesaw using a tenoning jig and a crosscut sled.

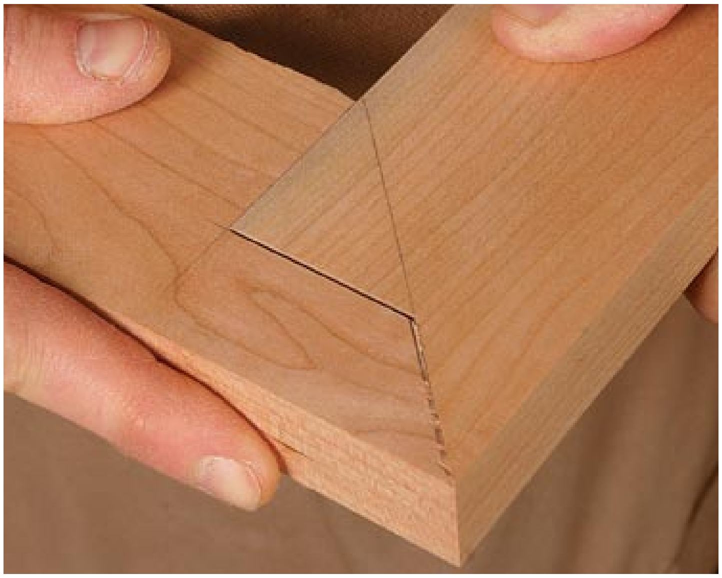
Cut the tenon, then the miter

Insert the piece to be tenoned into the jig, making sure the end is flush, and clamp the assembly to the workbench. I only remove 1⁄16 in. or so with each pass.

Leave a ½-in.-wide strip at the end of the board to avoid going too close to the end of the jig and tipping the router. Remember, this section will be removed later when cutting the miter.

After you have reached full depth, unclamp the jig and flip it over, making sure the workpiece stays aligned with the end of the jig, and cut the other side of the tenon. To check the fit, I open up the end of the mortised section on the bandsaw, staying a good distance from where the final end of the mortise will be. When done, remove the workpiece from the jig and use a chisel to square up the rounded corner on each side.

Now measure back 1½ in. from the shoulder and mark the tenon to length. At the tablesaw, raise the blade to just under

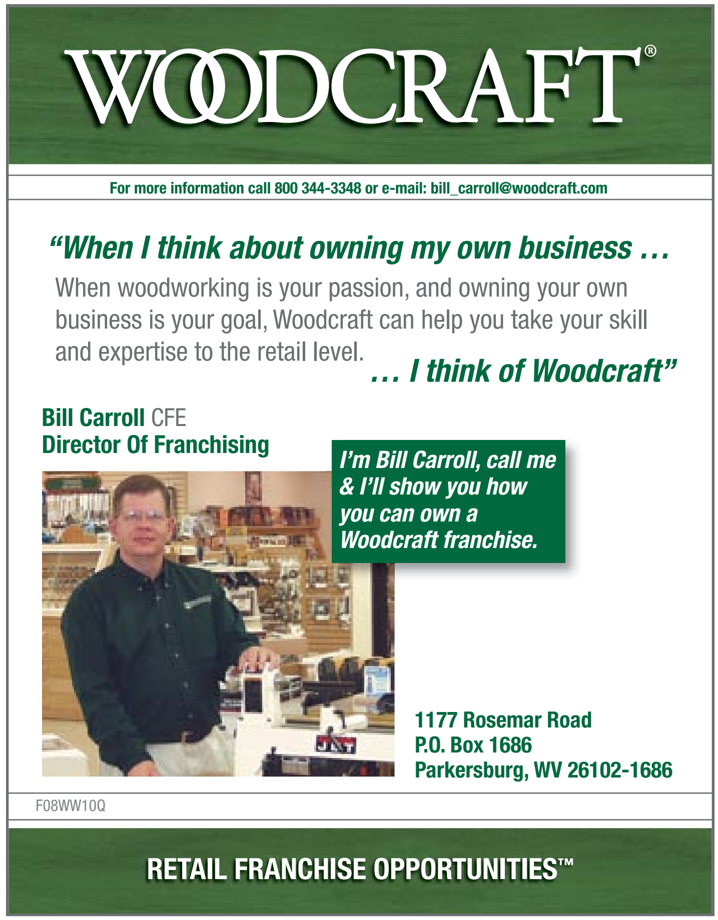


Getting close. *If your joint isn't perfect the first time, you may need to trim one of the miters to get a tight joint.*





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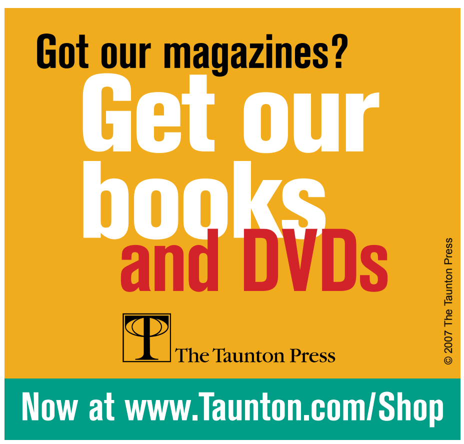


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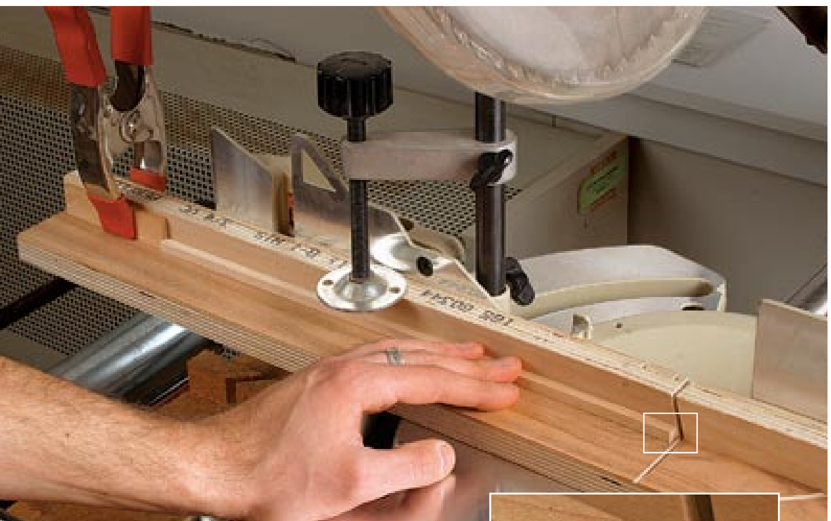


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Pin the joint



A square hole. *After the joint has been glued and allowed to dry, drill a ¼-in.-dia. through-hole on the drill press and then square up the hole from both sides using a chisel.*





A pyramid peg. *To cut the four-sided pyramid on the top of the ¼-in.-square rod, use a stop block on the miter saw and tilt the blade 15°.*

1½ in. and cut to this line. With the blade at the same height, make the same cut on the mortised piece 1 in. from the end.

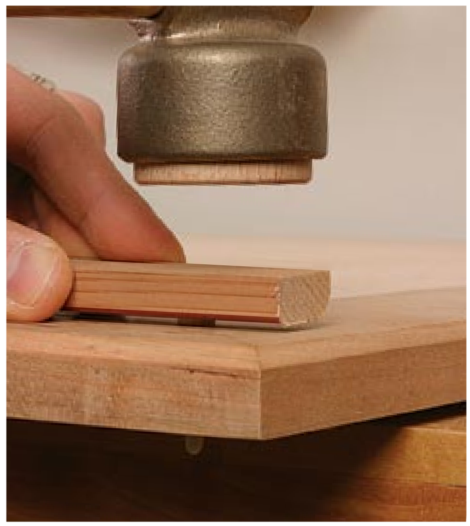
Before cutting the miter, use a combination square to check that the 45° miter line still meets the shoulder of the tenon at the inside edge. If you cut the tenon a little deep, redraw the miter line. You'll simply make the workpiece a little shorter.

After removing the majority of the waste at the bandsaw, tilt the tablesaw blade to 45°. I cut the tenon miter first, sneaking up to the line. If the blade ends up slightly high, I'll be cutting into the tenon, which is hidden in the completed joint, unlike the shoulders of the mortised section. With the blade set to the correct height, I can now cut the miter on the mortised board.

A wooden pin locks the joint

Cut a groove for the fixed or floating panel that goes in the frame. Now sand all the parts, insert the panel, and glue the joints together. Although most wooden pins don't go all the way through the joint, this one does. At the drill press, drill a ¼-in.-dia. through-hole for the pin; then square up the sides with a ¼-in. chisel.

Cut a ¼-in.-square strip of wood at the tablesaw, then take the strip to the miter saw and tilt the blade 15°. Using a stop block, make four cuts, revolving the strip 90° after each cut, to leave a four-sided pyramid on the end of the pin. Cut the pin about ¼ in. longer than the thickness of the joint, and bevel the non-pyramid end with sandpaper so it doesn't get hung up when you drive it into the hole. Place a little glue in the hole, and gently drive the pin into place. I use a piece of softwood to protect the top of the pyramid. Stop when the base of the pyramid is flush with the top of the workpiece. When dry, cut off the excess from the back with a flush-cutting saw. □



Soften the blow. *Use a piece of softwood to prevent damage to the pyramid-shaped peg when inserting it into the joint.*



Display the joint. *The kane tsugi can be used either vertically as on the doors of this bookcase, or horizontally as on a tabletop (photo, p. 90). The panel inside the frame can be fixed or floating.*

See ad index on page 101 for reader service number.

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how they did it

Bending the rules

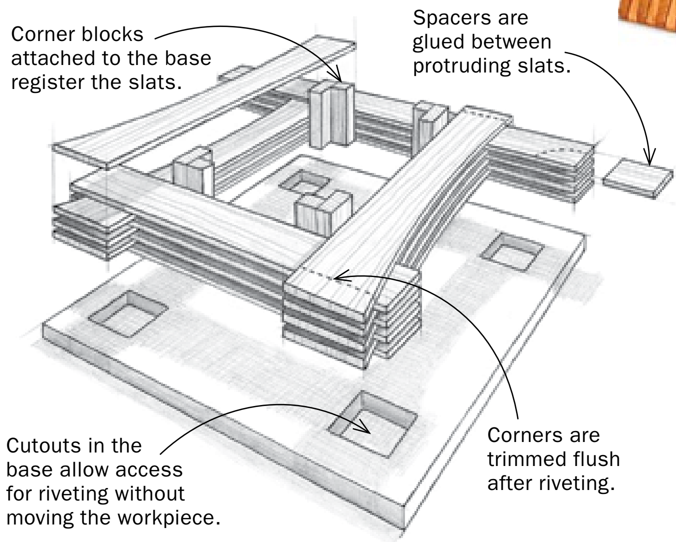
BY ANISSA KAPSALES



In a move away from typical solid-wood construction with invisible glue joints, Petter Southall (see his arched table on the back cover) has developed an innovative design/construction method using ⅜-in. slats joined with copper boat rivets to create tables, benches, beds, chairs, and sideboards. The genius of this approach is the combination of beauty, strength, and the efficient use of wood. There is cross-grain wood movement in each joint, but because the pieces are thin, they are able to restrain each other. Also, the rivets allow more movement than glue would. Ultimately, the table is extremely strong and rigid, though the construction is surprisingly basic.

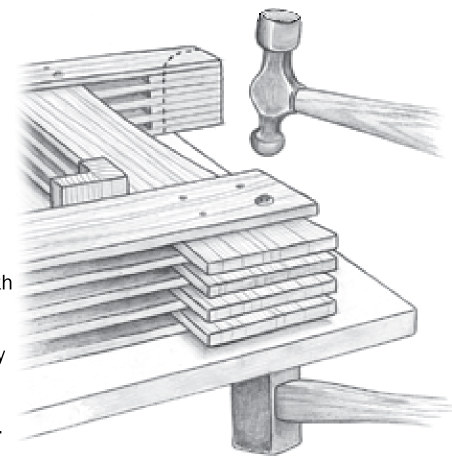
1. ASSEMBLE THE SLATS

Southall begins with the end units and arranges all the slats around a clamping jig to keep them in place. The pieces are left overlong and will be cut to size on the bandsaw after the rivets are in place.



2. DRILL AND RIVET

Southall uses a handheld drill in a drill-press attachment to drill the rivet holes. Standard copper rivets with roves are set with a ball-peen hammer. A heavy hammer is used on the nail-head side for support.

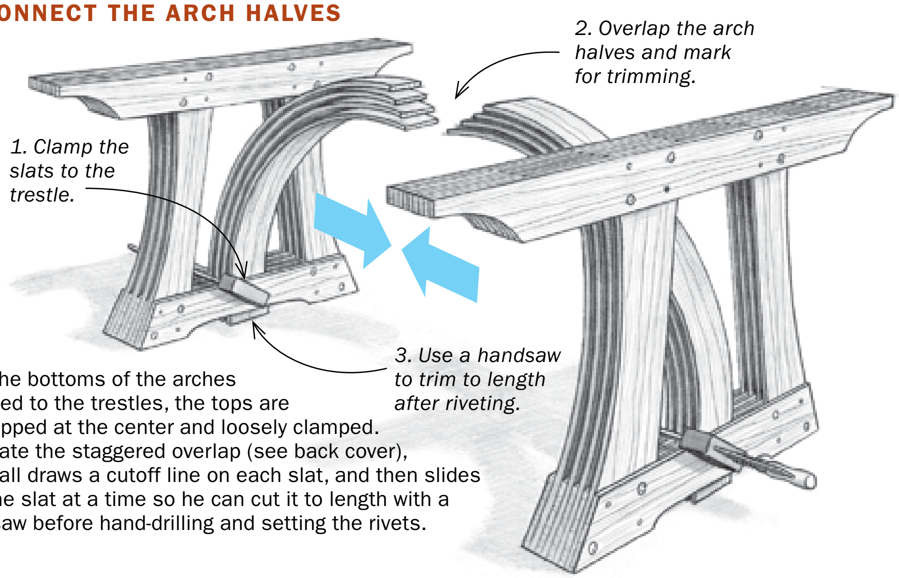


3. STEAM-BEND THE ARCHES



All the slats are pulled from the steambox and bent at the same time on a wide form. The slats are over-bent to allow for springback.

4. CONNECT THE ARCH HALVES



With the bottoms of the arches clamped to the trestles, the tops are overlapped at the center and loosely clamped. To create the staggered overlap (see back cover), Southall draws a cutoff line on each slat, and then slides out one slat at a time so he can cut it to length with a handsaw before hand-drilling and setting the rivets.

Photos: Petter Southall; drawings: John Tetreault



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Arc of a Career



With its arched base made entirely of thin oak slats clinched by copper rivets, Petter Southall's dining table interweaves fine cabinetmaking, traditional boatbuilding, and sustainable forestry. It's also a portrait of its maker's journey as a craftsman. Southall, now settled in southern England, lived in many parts of the world as a child and spent his 20s building boats in his mother's native Norway. Working in an ancient Scandinavian style, he specialized in rowboats and sailboats whose wooden planks were riveted together. He ran his own boat shop for five years, but a gift subscription to *Fine Woodworking* from his American-born father opened his eyes to the world of furniture making, and he made his way to California to study under James Krenov.



After a few more years of boatbuilding, Southall attended Hooke Park College, the experimental design school founded by John Makepeace in Dorset, England. Hooke Park challenged students to utilize small trees, thinnings, and waste products of the lumber industry in their designs. Southall's system of slats was inspired by that challenge. There is virtually no glue in the table—just a bit in the upper crosspieces where spacers between the slats create the impression of solid wood. But the rivets alone create a rock-solid structure. In another nod to boatbuilding, Southall steam-bends the slats that make up the arch. The boards in the top are dry-fit with loose tenons; bolts attaching them to the base also serve to hold them together.

—Jonathan Binzen

Photos: Mike Murless (top); Petter Southall, www.itre.co.uk

How They Did It Turn to p. 102 to learn more about Southall's innovative slat-and-rivet construction method.

Pro Portfolio To learn more about Southall's arched-furniture designs, watch an audio slide show at FineWoodworking.com/extras.